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ANNUAL REPORT

for

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HEALTH DEPARTMENT.

Singapore, 7th February, 1939.

THE PRESIDENT,

MUNICIPAL COMMISSIONERS,

SINGAPORE.

Sir,

I have the honour to submit my report on the working of the Health Department during the year 1938.

I. NOTIFIABLE DISEASES.

1801 cases were notified against 1233 in 1937 and 1533 in 1936.

The following table shows the comparison between this year and the previous ten years:—

Year	Typhoid Fever	Paratyphoid Fever	Diphtheria	Chicken-pox	Puerperal Fever	Erysipelas	Cerebro-Spinal Fever	Small-pox	Plague	Cholera	Typhus Fever	Scarlet Fever	Anthrax	Leprosy	TOTAL
1928 ..	230	12	59	350	11	8	15	9	5	9	1	3	—	—	712
1929 ..	133	—	57	577	13	8	3	9	3	—	—	6	—	—	809
1930 ..	156	2	63	349	11	9	22	—	—	—	—	2	—	—	614
1931 ..	150	1	65	211	28	6	8	3	—	—	—	—	—	—	472
1932 ..	114	1	124	542	16	2	6	8	—	—	—	1	—	—	814
1933 ..	248	7	244	288	11	5	4	1	1	—	1	—	—	—	810
1934 ..	116	4	254	412	6	5	7	1	—	—	3	2	—	—	810
1935 ..	415	9	193	529	16	5	11	52	—	—	18	—	—	—	1,248
1936 ..	455	6	176	833	22	9	16	1	—	—	15	—	—	—	1,533
1937 ..	222	5	217	709	16	6	17	—	—	—	8	—	1	32	1,233
Average for 10 years	223.9	4.7	145.2	480	15	6.3	10.9	8.4	0.9	0.9	4.6	1.4	0.1	*	905.5
1938 ...	736	4	262	659	31	11	24	2	—	—	10	—	—	62	1,801

*Leprosy was only made notifiable in 1937.

The following table shows the incidence by nationalities:—

DISEASE	Europeans	Eurasians	Chinese	Malays	Indians	Others	Total
Typhoid ..	3	18	662	21	29	3	736
Paratyphoid Fever..	—	—	2	—	2	—	4
Diphtheria ..	3	9	215	6	12	17	262
Chicken-pox ..	12	48	126	30	432	11	659
Puerperal Fever ..	—	—	22	5	4	—	31
Erysipelas ..	—	—	10	—	1	—	11
Cerebro-spinal Fever	—	—	18	—	6	—	24
Small-pox ..	—	—	—	—	2	—	2
Plague ..	—	—	—	—	—	—	—
Cholera ..	—	—	—	—	—	—	—
Typhus ..	1	—	2	—	7	—	10
Scarlet Fever ..	—	—	—	—	—	—	—
Anthrax ..	—	—	—	—	—	—	—
Leprosy ..	—	2	53	1	6	—	62
Total ..	19	77	1,110	63	501	31	1,801

The following return shows the number notified for each month of the year:—

DISEASE	January	February	March	April	May	June	July	August	September	October	November	December
Enteric Fever ..	7	12	11	8	15	364	159	56	39	36	13	16
Paratyphoid Fever	—	—	1	—	—	1	—	—	1	1	—	—
Diphtheria ..	30	18	32	12	22	35	12	16	15	17	20	33
Chicken-pox ..	54	100	68	54	43	27	21	32	45	55	97	63
Puerperal Fever .	1	5	3	2	2	3	3	4	3	4	1	—
Erysipelas ..	1	1	—	—	1	1	2	—	1	2	—	2
C'bro-spinal Fever	1	—	6	2	3	—	1	2	3	3	2	1
Small-pox ..	1	—	—	1	—	—	—	—	—	—	—	—
Plague ..	—	—	—	—	—	—	—	—	—	—	—	—
Cholera ..	—	—	—	—	—	—	—	—	—	—	—	—
Typhus ..	2	1	—	2	—	2	—	1	—	—	2	—
Scarlet Fever ..	—	—	—	—	—	—	—	—	—	—	—	—
Anthrax ..	—	—	—	—	—	—	—	—	—	—	—	—
Leprosy ..	3	4	1	7	10	6	3	8	6	7	6	1
Total ..	100	141	122	88	96	439	201	119	113	125	141	116

With the exception of Typhoid Fever nothing in these tables calls for special comment.

Apart from two cases of Smallpox we enjoyed another year of complete freedom from the three dangerous Infectious Diseases, Smallpox, Cholera and Plague. Even with one of the Smallpox cases there was an element of doubt in the diagnosis. It came from a house in which there were at the same time several cases of Chickenpox. Most of us were satisfied it was a case of Chickenpox but as one consultant was of opinion it might be a case of Variola minor it was treated as such and the contacts and the premises were dealt with accordingly. The other was a frank case of Smallpox. At first he gave a history of having just arrived from India but later denied this. As no connection with any previous case could be found and no further cases developed in the contacts, the likelihood is that the first story was the correct one and that he was discovered within a very short time of his arrival in the Colony.

In connection with Plague the usual rat-trapping laid down by the International Sanitary Convention was carried on throughout the year. 4,005 rats trapped in the Town and Port area were examined in the laboratory. None was found infected. The flea index remained low, being only 1.07 per live rat against 1.81 in the previous year.

TYPHOID AND PARATYPHOID FEVERS.

The number of cases notified was greatly in excess of that of any previous year. The notifications numbered 740 (4 Paratyphoid). The number of deaths was 202.

This increased incidence was caused by a localised epidemic or rather an epidemic with a localised source of infection which reached its height in June and July. The source was located by the end of June but the outbreak was kept alive by secondary infections well into October. In June 364 cases were notified, in July 159, in August 56, in September 39 and in October 36. By November the incidence had fallen to 13 cases, about the usual monthly number. Allowing 20 cases a month for the usual incidence of the disease, it may be said there were at least 550 cases associated with this outbreak. In all probability there were many more mild cases which were never reported.

A feature of the outbreak was the large number of young people attacked. Up to the end of July we had notifications of 229 attacks in school children and students while many more victims were under school age. The total number of deaths from Typhoid during the months the outbreak lasted was 163. Of these deaths 67 were of persons under 15 years of age.

A brief history of the outbreak and the final detection of the source of infection is of interest. On the 31st May, we received an intimation from the headmaster of a school in Coleman Street that four of his pupils were absent with Typhoid. Investigations amongst these and other absentees, amongst whom, incidentally, four more cases of Typhoid were discovered, showed that their homes were far apart. This immediately suggested a school infection and remembering our previous experiences in these localised outbreaks, suspicion immediately fell on the food and drink hawkers who frequented that school compound. Next

day, however, a case was reported from a school in Stanley Street, in the Telok Ayer district. Within a few more days, several other schools in this district became infected while notifications of attacks in children under school age and also in adults began to come in in increasing numbers from this district. Other cases, much further afield, also began to be reported. As already said suspicion was at first fastened on the hawkers frequenting the Coleman Street school and search was made amongst them for a possible carrier. But immediately the Telok Ayer cases began to be reported, it became obvious that we should likely find the source of infection there. Having regard to the numbers and distribution of the cases it was also evident that a single hawker "carrier" could not be the culprit and that the likelihood was that several hawkers were engaged in the distribution of some food or drink which was being infected at the source in process of preparation. Further, having regard to the age of most of the victims and from the histories they gave of what they were in the habit of buying from itinerant hawkers, the infected material was in all probability either ice-cream or some form of iced drink. This narrowed the search and we concentrated on premises in this district engaged in the manufacture of ice-cream and allied products. There were several such, one especially in Amoy Street, producing on quite a big scale and distributing its products all over the town through the medium of eight itinerant hawkers. It was rather interesting how our investigations of several distant cases seemed to lead back to these premises. Attacks in a resident in Zion Road and in two of the Great World Cabaret dancers suggested a hawker in that resort. In trying to trace a connection between the Great World hawkers and the Telok Ayer district, we finally found one hawker who obtained his ice-cream from this particular house in Amoy Street. He was admitted on the 8th June for examination with two others from the same house. Next day, two more from the same premises were admitted. But none was found to be excreting the Typhoid Bacillus. But again on the 14th June, suspicion was once more directed toward this house on a report that one of the hawkers from there had been found selling near the Coleman Street school, a fact which we had not been able to establish before. Despite repeated questioning of the occupier of the premises, no history of any previous illness of any member of his household could be obtained. But finally on 23rd June, the Typhoid bacillus was recovered from the stool of one of the coolies working in these premises. On questioning him he admitted that one of the house servants had been ill some months before and had stayed in the house for some days during his illness. The owner of the business again questioned, finally admitted this was so. After being ill for some days the servant in question had gone elsewhere for treatment. He returned after three weeks but as he was too ill to work he remained for only a few days when he was again sent away. He was finally run to earth in Bukit Timah village. On examination, he was found to have a strongly positive Widal and there was little doubt but that he was a recovered case of Typhoid. The owner subsequently admitted that his own son had been ill about the same time for three weeks. Both this child and another child were also found to have positive Widal.

It appears, therefore, that there were two and probably three acute cases of Typhoid and one passive carrier in the house at the same time, any or all of whom were capable of infecting the ice-cream manufactured on the premises. Possibly the heaviest infection took place about the third week in May when the sick man returned for a few days. At any rate the incubation period of the bulk of the cases is in accord with that supposition.

Cases occurring after the middle of July were in all probability secondary cases arising from original infections, either unrecognised or concealed. In many instances it was possible to link up the new infection with a previous case.

Of concealed cases there were quite a few and many were discovered and sent to hospital after house to house visits by our inspectors. In this connection, I should like to mention that we were greatly hampered in our work by the strong disinclination to send cases to hospital. Naturally perhaps, parents preferred their children to be under the care of their own private practitioners but I wish to take this opportunity to state that few houses in Singapore, and certainly none in the congested areas, are suitable for the treatment of Typhoid cases. Moreover, very few parents are capable of appreciating the very strict precautions that must be taken to prevent the spread of the disease and many private practitioners either do not visit frequently enough or are too busy to ensure their instructions are followed. In the very few instances where we did allow cases to be treated in their homes, surprise visits proved that practically no attempt was being made to maintain isolation.

Orders had finally to be enforced that all cases were to be sent to hospital.

Though at no time was the municipal water supply under serious suspicion, the whole distribution in the Telok Ayer district was carefully checked by the Water department.

All ice factories were more or less under suspicion and the staffs of all of them were examined.

In the course of the investigation and search for "carriers," 281 hawkers were taken into Middleton Hospital and examined. They were given a subsistence allowance of \$1 per day and in consequence no undue opposition was encountered. Only one carrier was found. He was the coolie already mentioned. He was kept under observation for about a month and was finally discharged when it was clear that he was no longer excreting the typhoid bacillus.

It is no habit of mine to say "I told you so" but I do wish to emphasise that this happening is only one that I have been prophesying over a number of years now. It is incumbent on all concerned to aim at tightening up the regulations under which food and drink are prepared and distributed to the general public, and to keep them tightened up. At the slightest relaxation, what has already happened, will happen again.

Apart from the entirely unnecessary toll of death especially of young children, this outbreak and its investigation and control cost the Department Votes upward of \$20,000, a sum which I could have expended much more usefully in other directions, though that sum is a mere fleabite compared with what the Croydon Corporation are faced with in consequence of their much smaller outbreak. I will not, however, labour that point, but to me at least there is a warning.

What I would like to impress on you and the other Commissioners is the very adverse effect on the whole Health department of this and similar happenings. It completely disturbed the smooth running of the department. For over six weeks every member of the staff almost was

immobilised in so far as his ordinary duties were concerned. Some were working literally day and night, Saturday and Sunday, and all the ordinary work of the department was more or less shelved. And this seems to happen so frequently of late that it disturbs me greatly.

Another extremely disturbing factor to me, was, that at the height of the outbreak when the General Hospital accommodation was taxed to the utmost, I was compelled to accept into the Middleton Hospital many of the Typhoid convalescents from the General Hospital. I was faced with the alternative of leaving the cases in their homes, which in the light of what I have already said was unthinkable. The Middleton Hospital was primarily designed for the reception and treatment of Cholera, Smallpox and Plague, and it was never intended for Typhoid cases. For a short time I put myself in the position that had there been an outbreak of any of these dangerous diseases I was not in a position to provide hospital accommodation. That state of affairs should not be allowed to recur.

The only comfort I can take from the outbreak is that I was able to persuade the Commissioners to tighten up the regulations for the manufacture and sale of ice-cream. It was agreed that in 1939 no hawker would be allowed to sell ice-cream unless it was obtained from premises which had been licensed in that behalf. Following on that decision, the requirements for licensed ice-cream factories have been drafted and generally approved and will be in operation this year. I regret to say, however, that memories in Singapore are notoriously short and there are already signs that the first flush of enthusiasm may be waning. There is already evidence that we may be strongly opposed in putting our requirements into operation. Admittedly, these are very strict—but this is a country where they should be strict. I sincerely trust that we may not be asked to compromise too far.

DIPHTHERIA.

262 cases were notified against 217 cases in 1937. Of 203 treated in the Middleton Hospital, 42 died, a mortality of 20.3%. Of these admissions, 52 required tracheotomy. Many were already in extremis when admitted showing that parents are still slow to realise the serious nature of this disease.

At one time I was of opinion that Diphtheria was always more or less common in Singapore and that the incidence increasing with the years only betokened a better diagnosis and perhaps a greater readiness on the part of Asiatic parents to consult a doctor. But I am now convinced and entirely agree with Dr. Gilmour that the incidence of the disease is increasing, that there is little or no natural immunity in Singapore children and that sooner or later, unless steps are taken to prevent it, we shall be faced with a major epidemic.

Early in the year a small experiment designed to test the state of immunity toward this disease was completed. It was carried out by Dr. Gilmour and the medical officers of the Infant Welfare Department. Several hundred children, most of them just over a year old, were Schick tested. Scale of the investigation was not perhaps large but the results were enough to show that practically no natural immunity exists. I am glad to report that following on the result of this investigation it was decided to make provision in 1939 for the

offering of voluntary protective inoculation for the children of any parents who might wish to avail themselves of it. Two special nurses have been appointed to the Infant Welfare department and it is the intention to offer vaccination to all infants just as they are taken off the Clinic registers, i.e. at one year of age.

GENERAL.

1. Medical Inspection of Passengers.

The Government Health Office issued 105 permits to land. These embraced 180 passengers of whom 12 failed to report.

2. Houses quarantined and disinfected.

1 house was quarantined and 574 were disinfected.

3. Infectious persons and contacts.

744 patients were sent to Middleton Hospital. 15 Smallpox contacts were sent to the quarantine station at St. John's Island. 8 bodies were removed to the Middleton Hospital mortuary for post mortem while 74 bodies were buried under supervision.

II. MIDDLETON HOSPITAL.

At the end of 1937 there were 53 patients remaining in hospital, while during the year there were 1,916 new admissions, making a total treated of 1,969. Of these 1,843 were discharged, 79 died and 47 remained in hospital at the end of the year. The total admissions for 1937 was 1,324 but the very much increased figure for 1938 is entirely accounted for by the admissions of Typhoid convalescents and of hawkers for investigation and search for "carriers." These two classes accounted for 534 admissions between them.

Of the 79 deaths, 42 were due to Diphtheria, 15 to Cerebro-spinal Fever, 9 to Measles or its complications and 12 to other causes, none of them being a notifiable disease.

The full report of the Acting Superintendant, Dr. Thurai, is appended.

III. VACCINATION.

The following vaccinations were reported:—

	Successful	Modified	Failed	Not Seen	Total
Municipal Vaccinators ..	15,742	251	4	1,103	17,100
Private Vaccinators ..	415	—	—	—	415
Medical Practitioners ..	2,812	—	—	—	2,812
Total ..	18,969	251	4	1,103	20,327

The nationalities of those vaccinated by Municipal Vaccinators were Europeans 29, Eurasians 149, Chinese 14,441, Malays 1,586, Indians 793 and Others 102. Of these 8,683 were males and 8,417 females of the following ages:—

Under 1 year	..	..	..	11,256
1 to 2 years	..	..	..	4,861
3 to 5 years	..	..	..	232
6 to 10 years	..	..	..	192
11 to 20 years	..	..	..	232
Over 20 years	..	..	..	327
.. Total ..				17,100

12,941 vaccinations were performed at the Depots, 3,263 at Police Stations, 757 at the Child Welfare Clinics and 139 in private houses.

VITAL STATISTICS.

In my 1936 report I discussed at length certain formulae put forward by Mr. Vlieland, the officer who conducted the 1931 All Malayan Census, designed to give a closer estimation of the population in intercensal years and expressed my intention of making use of them in future years. They are based on two assumptions, one, that the maternity rate for Asiatic women is saturated and more or less a constant and the other that the relative deadliness of a given year as compared with the last census year is the same for both sexes. Consequently when the numbers of births and deaths for a year are known it should be possible to arrive at a reasonably accurate estimation of the mean annual population for that year.

The population for 1937 was arrived at by those methods and was 520,164. For purposes of the weekly and monthly statistics during 1938, we had to be content with a temporary figure which was obtained by adding the excess of births over deaths in 1937 to that figure. That was 531,099. Knowing the births and deaths for 1938 and by applying Mr. Vlieland's methods, that figure is now amended to 546,050. On this latter figure then all the statistics and rates to follow are based. It is distributed by Sex and Nationality as follows:—

		Males.	Females.	Total.
Europeans	..	5,616	3,060	8,676
Eurasians	..	3,588	3,761	7,349
Chinese	..	244,644	178,045	422,689
Malays	..	28,717	23,078	51,795
Indians	..	37,694	9,297	46,991
Others	..	4,750	3,800	8,550
Total	..	325,009	221,041	546,050

BIRTHS.

The total number of births registered during the year was 23,842 compared with 22,621 in 1937 and 20,878 in 1936. This represents a 5% increase over the previous year. A study of the tables to follow shows that this increase is entirely accounted for by increased Chinese

births. This is in consonance with known facts as there was evidence during the year of an unusual number of women arriving from China.

There were 12,255 male children and 11,587 female born against 11,771 and 10,850 for 1937.

The crude birth rate was 43.66 against 43.49. This figure is really of little or no value as if it is accepted that the maternity rate for Asiatic women is saturated all any increase means is an increasing proportion of women in the population.

The following is the number of births for each month of the year, the 1937 figures being also shown:—

Month	1938	1937	Month	1938	1937
January ..	1,761	1,702	July ..	1,912	1,850
February ..	1,771	1,540	August ..	2,037	1,950
March ..	1,961	1,728	September ..	1,993	1,939
April ..	1,823	1,800	October ..	2,247	2,085
May ..	1,983	1,880	November ..	2,306	2,189
June ..	1,985	1,901	December ..	2,063	2,056

And the nationalities were:—

	1938.			1937.		
	Males	Females	Total	Males	Females	Total
Europeans ..	136	110	246	132	113	245
Eurasians ..	91	114	205	99	92	191
Chinese ..	10,250	9,513	19,763	9,675	8,902	18,577
Malays ..	1,027	1,027	2,054	1,028	934	1,962
Indians ..	628	683	1,311	692	663	1,355
Others ..	123	140	263	145	146	291
Total ..	12,255	11,587	23,842	11,771	10,850	22,621

There were 643 still births compared with 623 in 1937.

DEATHS.

The total number of deaths for the year was 12,488 against 11,686 in 1937 and the crude death rate 22.87 per 1,000 against 22.46.

382 persons died who had been less than three months resident in Singapore. Corrected for these the death rate is reduced to 22.17.

The excess of births over deaths was 11,354.

The following return shows the number of deaths and the death rate for each month of the year:—

Month	Deaths	Rate	Month	Deaths	Rate
January ..	1,030	22.22	July ..	1,153	24.48
February ..	881	20.25	August ..	1,033	22.29
March ..	956	20.63	September ..	1,081	24.10
April ..	1,094	24.39	October ..	1,001	21.60
May ..	1,124	24.25	November ..	901	20.09
June ..	1,286	28.67	December ..	948	20.45

The death rates for the different nationalities were:—

Nationality	1938			1937		
	Males	Females	Total	Males	Females	Total
Europeans ..	4.99	5.23	5.07	5.62	5.40	5.54
Eurasians ..	11.98	12.76	12.38	11.05	13.71	12.42
Chinese ..	25.13	23.15	24.29	24.51	22.59	23.70
Malays ..	22.22	22.45	22.32	22.81	23.04	22.91
Indians ..	15.49	26.68	17.71	15.47	26.64	17.76
Others ..	10.11	12.63	11.23	13.92	11.65	12.91
Total ..	23.04	22.62	22.87	22.63	22.23	22.46

The following return gives the number of deaths from each cause of disease by nationality, age and sex. The classification followed is that of the 1931 International List:—

I. Infectious and Parasitic Diseases.		Nationality.	Under 3 Months		3 to 12 Months		1 to 2 Years		2 to 3 Years		3 to 4 Years		4 to 5 Years		5 to 10 Years		10 to 15 Years		15 to 20 Years		20 to 25 Years		25 to 35 Years		35 to 45 Years		45 to 55 Years		Over 55		Un-known		TOTAL		Grand Totals	
			M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
1. Typhoid Fever.		Europeans	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
		Eurasians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Chinese	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Malays	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Indians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2. Paratyphoid Fevers.		Others	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Europeans	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Eurasians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Chinese	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Malays	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7. Measles.		Indians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Others	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Europeans	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Eurasians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Chinese
9. Whooping Cough.		Malays	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Indians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Others	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Europeans	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Eurasians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10. Diphtheria.		Chinese	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Malays	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Indians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Others	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Europeans
11. Influenza.	(1) With respiratory complications.	Europeans	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Eurasians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..</		

MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

[illegible]

IV. Diseases of the Blood and Blood-Forming Organs—(contd.)

[illegible]

V. Chronic Poisoning.

7F. Alcoholism (acute or chronic).	Europeans	Eurasians	Chinese	Malays	Indians	Others

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

(D-21^e)

[illegible]

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

[illegible]

VIII. Diseases of the Respiratory System—(contd.)

[illegible]

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

[illegible]

IX. Diseases of the Digestive System .-(*contd.*)

[illegible]

MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

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MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

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MORTALITY ACCORDING TO DISEASE, AGE AND SEX FOR THE YEAR 1938.

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MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

XIV.	Congenital Malformations.—(contd.)	Nationality.
	(5) Congenital malformation unspecified	Europeans Eurasians Chinese Malays Indians Others
XV. Diseases of Early Infancy.		
158.	Congenital debility.	Europeans Eurasians Chinese Malays Indians Others
159.	Premature birth.	Europeans Eurasians Chinese Malays Indians Others
160.	Injury at birth. (a) With mention of caesarean section. (b) Without mention of caesarean section.	Europeans Eurasians Chinese Malays Indians Others
161.	Other diseases peculiar to early infancy. (a) Atelectasis. (b) Icterus neonatorum.	Europeans Eurasians Chinese Malays Indians Others

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

XV. Diseases of Early Infancy—(contd.)										Nationality.		Grand Totals																																			
												Under 3 Months		3 to 12 Months		1 to 2 Years		2 to 3 Years		3 to 4 Years		4 to 5 Years		5 to 10 Years		10 to 15 Years		15 to 20 Years		20 to 25 Years		25 to 35 Years		35 to 45 Years		45 to 55 Years		Over 55		Un-known		TOTAL					
												M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F				
(c) Other diseases included under 161c.												(1) Diseases of the umbilicus.												Europeans Eurasians Chinese Malays Indians Others												5											
(2) Pemphigus neonatorum.												Europeans Eurasians Chinese Malays Indians Others												1												2											
(3) Other diseases included under 161c.												Europeans Eurasians Chinese Malays Indians Others												3												3											
XVI. Old Age.												(b) Other forms of senile decay.												Europeans Eurasians Chinese Malays Indians Others												162. Old age.											
XVII. Deaths from Violence.												163. Suicide by solid or liquid poisons and corrosive substances.												Europeans Eurasians Chinese Malays Indians Others												165. Suicide by hanging or strangulation.											

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

[illegible]

MORTALITY ACCORDING TO DISEASE, NATIONALITY, AGE AND SEX FOR THE YEAR 1938.

XVIII. Ill-Defined Diseases—(contd.)...			Nationality.		Under 3 Months		1 to 2 Years		2 to 3 Years		3 to 4 Years		4 to 5 Years		5 to 10 Years		10 to 15 Years		15 to 20 Years		20 to 25 Years		25 to 35 Years		35 to 45 Years		15 to 55 Years		Over 55		Un-known		TOTAL		Grand Totals	
					3 to 12 Months		1 to 2 Years		2 to 3 Years		3 to 4 Years		4 to 5 Years		5 to 10 Years		10 to 15 Years		15 to 20 Years		20 to 25 Years		25 to 35 Years		35 to 45 Years		15 to 55 Years		Over 55		Un-known		TOTAL			
					M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		M	F
(2) Other ill-defined causes.		Europeans	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Eurasians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Chinese	1	..	..	2	12	2	..	4	..	1	..	2	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Malays	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Indians	2	..	1	..	..	1	..	..	2	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
(2) Causes not specified.		Others	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Europeans	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Eurasians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Chinese	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Malays	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Indians	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		Others	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
		1247	1118	1033	832	299	269	163	153	115	112	81	63	123	118	102	75	129	105	283	189	771	484	919	444	1121	376	1100	659	2	3	7488	5000	12488		

The following return shows the total number of deaths at different age periods in the different nationalities:—

Mortality According to Nationalities and Ages for the Year 1938.

Nationality	Sex	Under 3 months	3—12 months	1—2 years	2—3 years	3—4 years	4—5 years	5—10 years	10—15 years	15—20 years	20—25 years	25—35 years	35—45 years	45—55 years	Over 55 years	Unknown	TOTAL
Indians	M	1	—	—	—	—	—	—	—	1	3	8	2	5	8	—	28
	F	2	1	—	1	—	—	1	1	—	—	1	3	1	5	—	16
Indians	M	1	3	2	—	—	1	1	1	—	2	2	5	10	15	—	43
	F	4	4	3	—	1	—	—	1	—	1	7	5	4	18	—	48
Europeans	M	1,037	854	262	143	106	71	112	86	91	206	600	734	941	903	1	6,147
	F	960	684	214	137	100	61	100	63	74	134	393	382	301	518	1	4,122
Europeans	M	142	126	26	12	5	4	7	8	17	25	49	73	55	89	—	638
	F	103	113	28	12	2	1	8	7	14	31	52	31	46	70	—	518
Europeans	M	58	44	8	8	4	4	3	7	19	45	108	98	104	74	—	584
	F	40	27	20	3	8	1	9	3	16	19	27	19	21	35	—	248
Europeans	M	8	6	1	—	—	1	—	—	1	2	4	7	6	11	1	48
	F	9	3	4	—	1	—	—	—	1	4	4	4	3	13	2	48
Europeans	M	1,247	1,033	299	163	115	81	123	102	129	283	771	919	1,121	1,100	2	7,488
	F	1,118	832	269	153	112	63	118	75	105	189	484	444	376	659	3	5,000
Total		2,365	1,865	568	316	227	144	241	177	234	472	1,255	1,363	1,497	1,759	5	12,488

GENERAL DEATH RATE.

The crude death rate for the year was 22.87 per 1000 living compared with 22.46 in 1937.

The chief causes of death and rate per 1000 living are set out in the following table, the 1937 figures being given for comparison:—

		1938		1937	
		Cases	Rate per mille	Cases	Rate per mille
Bronchitis and Pneumonias	..	2,309	4.228	1,978	3.803
Tuberculosis	..	1,630	2.985	1,475	2.835
Infantile Convulsions (up to 5 years)	..	996	1.824	993	1.909
Beri-Beri	..	889	1.628	595	1.144
Diarrhoea & Enteritis	..	780	1.428	896	1.722
Diseases of Early Infancy	..	719	1.317	720	1.384
Nephritis	..	455	.833	498	.957
Malaria	..	357	.654	428	.823
Old Age	..	341	.624	369	.709
Cancer	..	316	.579	286	.550
Violence	..	268	.491	304	.584
Influenza	..	232	.425	143	.271
Heart Disease (undefined)	..	228	.415	189	.363
Dysenteries	..	206	.377	200	.384
Typhoid	..	202	.370	74	.142

So far as these figures compare with those of 1937 there is nothing that calls for comment. It is disappointing to see that the first two on the list show a recession. Taken together, in 1937 they were responsible for 29.5% of all deaths but in the year under review 31.5%. Not that one expects any improvement in the rates for these diseases while the present awful housing conditions prevail. I had a good deal to say about that last year and have nothing much to add except to say that conditions may be rather worse, if anything.

Some figures which came to hand during the year seem to me to be worth publishing. They prove that the overcrowding is becoming progressively greater and that my statements in previous years were in no way exaggerated. They represent successive population enumerations carried out in certain blocks in the congested areas:—

Total Population in Certain Years.				
Block Boundaries		1933	1936	1938
I.	Queen Street, Arab Street, Johore Road and Ophir Road	779	607	1,210
II.	North Bridge Road, Sumbawa Road, Minto Road and Jalan Sultan ..	1,213	1,205	1,444
III.	Queen Street, Ophir Road, Johore Road and Rochore Road	700	927	1,155
IV.	Japan Street, Cecil Street, McCallum Street & Stanley Street	771	1,312	1,249
V.	Cross Street, Cecil Street, Japan Street & Telok Ayer Street	1,712	1,862	1,975
VI.	Cross Street, Robinson Road, Japan Street & Cecil Street	489	823	882

There has been in the past and there still is so much loose talk about Singapore Slums that I feel justified in setting down my own ideas on the subject. At the mention of slums one's thoughts immediately turn to more civilised countries in cold and temperate zones, where, in the cities, several conditions contribute to produce a slum dwelling. Many of these are associated with the structure of the building and with the materials from which it is built. Lack of a damp-proof course for instance can make a building unhealthy. I wish to make it clear that our slum is quite a different matter. 75% of the "slumminess" of our domestic buildings is caused by overcrowding. In other words, if the houses in the congested areas could be emptied of 75% of their present occupants the remainder would be housed in, if not ideal, at least a reasonably sanitary manner i.e. the actual buildings themselves have not as a rule the inherent qualities that go to produce a slum. What this in turn means is that what we require to solve our problem is primarily new housing—and still more new housing. And until we can see this new housing on a grand scale, we need expect little improvement in respect of those diseases that are fostered by close herding and overcrowding.

While the demolition and replanning of the congested areas and their rebuilding according to modern standards is certainly desirable, it is emphatically not the most urgent part of our housing problem. It can and should wait until the congestion can be relieved and that can only be brought about by the provision of fresh housing on a hitherto undreamt of scale.

From an economic point of view, too, that is the logical order in which things should be done. Whatever one wishes to think, one cannot get away from the fact that the houses in domestic occupation in the congested areas today owe their artificially high value to one fact and one fact only, namely that they are densely overcrowded. I am confident that could we have unlimited new building and the excess population moved outward, the high rentals at present demanded in the centre of the town could no longer obtain and the property in question would fall to such a price that would render its compulsory acquisition, demolition and rebuilding, a much less costly matter than it is to-day.

I do not pretend for a moment that this would greatly reduce rents so far as the occupant is concerned. Nor do I see that it is necessary as many at present living in the congested areas seem well able to pay the inordinate rentals for their miserable cramped quarters. But these people could have at least twice and perhaps thrice as much accommodation for the same figure, which would give them and their children a chance to live decently.

While my previous remarks apply to many of the town dwellers who seem to be able to pay economic rentals for reasonable accommodation in permanent buildings it must be recognised, however, that there is a class, and quite a large one, which cannot afford to pay economic rentals for reasonable quarters in any kind of permanent housing either old or projected, and which, if it is to be housed reasonably, must be assisted in one form or another. To this class belong the numerous unattached artisans, and the semi-skilled, and a great number of casual labourers. Many of them are married and have large families. They are at present housed either in dilapidated wood and attap huts in the undeveloped areas, or occupy the cheapest and most miserable cubicles in the built up property of the poorer type. It may be they are not paid a proper wage for their labour. That is outside my province. But they are nevertheless very useful members of the community, and they must be housed. In the Balestier district the Improvement Trust has in recent years built several blocks of small houses very suitable for this class. They are very popular and could be filled many times over. The rentals are low. Indeed, there is no question of the Trust receiving an economic return and to that extent this can be described as subsidised housing. More blocks are in process of erection and more projected, and I sincerely hope the Trust will be able to build many more in the future.

But there is another alternative to be considered by which quite a number of the above class might be sanitarily housed. In this connection I wish first to take this opportunity to correct once for all a mistaken impression which I am aware exists in the minds of many, that the responsible municipal authority which insists on permanent materials only being used in the construction of domestic dwellings is the Health department. I wish most emphatically to state that this department has always been willing to approve plans for wood and attap buildings. Indeed so far as I myself am concerned, I am convinced from long and

close observation that, with certain safeguards, the lower class Asiatic and his children are healthier and happier in those unpretentious and, to the uninitiated, almost mean looking huts. For obvious reasons they are usually erected in the lowlying undeveloped lands and it is their squalid surroundings and lack of amenities generally which cause them to look meaner than they really are. Actually they have abundance of fresh air and sunlight and give far more accommodation to a family and better accommodation in the way of cooking and washing facilities than the single small cubicle which is all that a poor family can afford to pay for in the built-up property.

It is true that the department has been, on more than one occasion, compelled to take action against this very type of building. Hence, perhaps, the mistaken impression. But it has only done so where the hut building was entirely uncontrolled, where the huts had been built in a haphazard way to no plan or layout, where there were no back-lanes for scavenging, and where finally the huts had been so added to by unauthorised additions and lean-to sheds that a whole area had become entirely roofed over and the resulting village, taken as a whole, constituted a menace not only to its own occupants but to surrounding districts.

To my mind, this, which for want of a better term, I describe as sub-standard housing of wood and attap, is ideal for certain types of dwellers and is well within the reach of their purses. The huts should be built to a type plan and properly spaced in a proper layout. No additions to them should be permitted. There should be access and back-lanes very lightly made up and there is no necessity for any elaborate drainage. All that is required are a few concrete inverts joining up the sanitary block to the back-lane drain.

The criticism invariably levelled at this type of construction by the experts is its high cost of maintenance. But when each hut is owned by its occupier the story is quite different. When the roof leaks he does not expect a new roof. He spends a few cents on fresh attaps and repairs the leak himself. When a piece of match boarding becomes worm eaten, if he even permits that to happen, he does not wait until the whole structure is falling to pieces. He replaces the faulty board by a new one. I have known many such huts that have been in existence over a period of twenty-five years that seem as sound today as when first I saw them.

With that one proviso then that the tenants should themselves own their huts, I would encourage and recommend almost unlimited building of this nature. It is rather wonderful how the very poorest seem to be able to raise the small amount of capital required for the construction of such a hut. We bought out many huts of this nature in the course of our anti-sundaicus measures in the Kallang Basin and it was a surprise to me how many of them were tenant owned.

All that is required is the land and there is much that is still available comparatively close to the town which is suitable for the purpose. If private landowners are not interested then Government, the Commissioners, and the Improvement Trust have suitable areas not likely to be required for more substantial buildings for some years to come which they could let out to these people on very nominal ground rents.

Speaking generally with regard to Housing, the Improvement Ordinance for most of the year was in the melting pot. A Committee

which sat frequently throughout the year took it thoroughly to pieces. The Ordinance is due to be completely re-drafted—in, I hope, the not too distant future.

Arising out of the urgent shortage of houses a small Committee was appointed to examine the position and make immediate recommendations. I was invited to put my views before it. It got through its labours expeditiously and, I understand, submitted its report some months ago now, but so far I have not been privileged to see it.

INFANTILE DEATH RATE.

This was 177.4 per 1,000 live births against 171.9 in 1937 and 191.6 in 1936.

The total number of deaths under 1 year was 4,230.

INFANTILE MORTALITY BY RACES 1928—1938.

Year	Europeans	Eurasians	Chinese	Malays	Indians	Others	All Races
1928 ..	52.4	173.9	201.1	270.9	154.6	44.3	202.1
1929 ..	50.4	134.3	191.4	292.1	169.5	107.0	197.5
1930 ..	40.3	171.9	217.4	290.4	190.9	37.9	219.0
1931 ..	28.7	110.0	204.6	265.6	159.1	104.8	204.3
1932 ..	6.1	67.0	181.6	254.9	109.8	86.9	180.5
1933 ..	33.0	121.6	176.1	246.0	128.5	88.6	176.5
1934 ..	27.2	109.4	176.6	267.6	133.2	88.9	179.3
1935 ..	13.8	80.0	172.4	225.7	136.0	86.9	171.2
1936 ..	26.7	137.4	197.3	219.9	121.0	96.1	191.6
1937 ..	12.2	109.9	172.4	229.9	139.5	72.7	171.9
1938 ..	16.3	58.5	178.9	235.6	128.9	98.9	177.4

The main causes of death and rates per 1,000 births for each group are set out in the following table, the 1937 figures and rates being given for comparison:—

	1937		1938	
	Cases	Rates per mille	Cases	Rates per mille
Convulsions	857	37.885	851	35.693
Bronchitis & Pneumonias ..	786	34.746	951	39.887
Diseases of Early Infancy ..	717	31.696	719	30.157
Diarrhoea and Enteritis ..	633	27.983	594	24.914
Tetanus	193	8.488	166	6.962
Beri-Beri	132	5.835	360	15.099
Congenital Syphilis ..	121	5.349	151	6.333
	<u>3439</u>	<u>151.982</u>	<u>3792</u>	<u>159.047</u>

The increase in the rate over that of last year is a little disappointing but is perhaps not to be wondered at. It could be accounted for entirely by the increased number of Beri-Beri deaths, but it may be remembered that in my 1937 report I was sceptical as to whether the 132 deaths reported as being due to Beri-Beri in that year was a true bill. The 360 deaths this year may mean an increase but I strongly doubt it. The conditions contributing to produce this disease were not more marked in 1938 than in 1937. The increase is much more likely due to a better diagnosis. It is significant, anyway, that if Beri-Beri is lumped with such vague causes of death as Convulsions, Diseases of Early Infancy and Diarrhoea and Enteritis, with any one of which it can easily be confused, the rates for the two years are not essentially different, being 105.8 per 1000 in 1938 against 103.3 in 1937.

On the other hand the Bronchitis and Pneumonia rate increased by over 5 per 1,000. I think it is much more likely that the increased deaths may be found here. It is not incompatible, at any rate, with the state of domestic housing.

Early in the year a beginning was made with Ante-natal work on an organised basis. It is directed specifically in the first instance toward the prevention of Congenital Syphilis and Infantile Beri-Beri, though naturally any pregnant mother can come for advice. During the year these ante-natal clinics showed ever increasing popularity and there is little doubt but that this side of our Infant Welfare Department will play a big part in the future in the saving of Infant life. The numbers treated so far are naturally too small to permit of any deductions being drawn. Full particulars will be found in the detailed report of the Lady Medical Officer.

Old customs die hard. From time immemorial Chinese women have been used, for forty days before and after parturition, to a special diet consisting mainly of dried fish and rice, and to this they rigidly adhere, and it is extremely difficult to get them to make any change. Such a diet today seems to be peculiarly likely to produce Beri-Beri. Experience could never cause a mistake of this nature. The explanation must be of course that the original under-milled rice with its plentiful vitamin content has been replaced by the avitaminosed highly polished rice that civilisation with its modern milling has brought into being. One finds the greatest difficulty, at least in the town, to persuade poor mothers to revert to the unpolished rice. And I suppose one can hardly blame them, as they naturally must feel that if it is consumed by their betters it ought to be good enough for them. Moreover, so little of it is sold that it is actually more expensive. Nor is it so appetising in appearance. And its keeping qualities are poor as it becomes decidedly musty when kept for any length of time.

It seems to me that very serious consideration should be given to ways and means of bringing this article of diet readily and easily within the reach of the poorer classes. I suggest that the experiment might be tried out of setting up stalls in each of our three clinics from which unpolished rice could be sold at a little above cost not only to the mothers who attend the clinics but to any other member of the public who chooses to take advantage of the facility. If a contractor could be found who would be content with an ordinary trading profit, I am sure the ultimate

cost to the Commissioners would be small. Otherwise we must depend, as we do at present, on the free distribution of drugs and other expensive products containing the necessary vitamins. And we have no certainty when we give out these costly preparations that full use is being made of them.

Quite a few known syphilitic mothers were induced to attend the Clinics when it was found they were again pregnant. A varying amount of specific treatment was given and already several apparently healthy infants have been born to them. Those interested are referred to the report of the Infant Welfare department for fuller particulars.

V. CERTIFICATION OF DEATHS.

The following return shows the number of deaths, the causes of which were certified by Medicalmen, Inspecting Registrars and the Coroner respectively:—

	Europeans	Eurasians	Chinese	Malays	Indians	Others	Total
Medicalmen ..	38	75	7,801	287	588	75	8,864
Registrars ..	1	12	2,016	852	190	14	3,085
Coroner ..	5	4	452	17	54	7	539
Total ..	44	91	10,269	1,156	832	96	12,488

This gives a percentage of 71 certified by medical practitioners, 24.7 by Registrars and 4.3 by the Coroner.

I remarked last year that far too large a proportion of the Malay deaths were being certified by Registrars. I also said there was no real justification for it, and hinted that our powers to order a post mortem in cases of doubt might be judiciously applied. I think this threat might now be put in operation and most certainly the possibility of our doing so ought to be advertised in the community concerned.

The percentage for the past 10 years has been as follows:—

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Medicalmen ..	66.0	68.2	63.6	63.5	64.5	62.8	65.7	66.9	68.5	71.0
Registrars ..	29.1	28.4	31.6	29.6	29.0	31.1	28.7	27.7	26.0	24.7
Coroner ..	4.8	3.3	4.8	6.8	6.5	6.1	5.6	5.4	5.5	4.3

There were 23,842 births and 12,488 deaths registered at the Central Births and Deaths Office in the Municipal building. 15 births and 1 death were entered in the Post Registration books and the sum of \$126 was received in late registration fees. A further sum of \$7 for search fees was collected.

During the year a new Births and Deaths Registration Ordinance was passed. By it the Health Officer ceased to be a Registrar and so was relieved of several trying little duties which at no time, in my opinion, were ever part of a Health Officer's work and on which perforce being Registrar he had to waste a good deal of time. I refer particularly to alterations in the Register. These in future with late registrations and prosecutions for infringements will be carried out by the Registrar-General's department in Fullerton Building.

VI & VII. ANALYTICAL AND BACTERIOLOGICAL LABORATORIES.

Both reports are appended and should be published in full.

VIII. ANTI-MOSQUITO WORK.

This sub-department had a very busy year indeed and much useful work was carried out. Full details will be found in Dr. Canton's report which is appended.

New Works. New work was carried out in St. Michael's Road district, and *Anopheles Sundaicus* breeding area, in three short ravines in Thomson Road, all *Anopheles Maculatus* breeding places and in several smaller areas elsewhere.

These new works involved the laying of 1,427 yards of subsoil piping, 1,275 yards of concrete channels and 1,461 yards of concrete revetment 1,500 yards of main ditches were also cut.

Extensions and new works in existing areas involved the laying of 6,837 yards of subsoil pipes, 12,835 yards of concrete channels and 10,081 yards of revetting.

Minor repairs in the old areas also involved the laying of 4,746 yards of subsoil pipes, 1,933 yards of channels and 81 yards of revetting.

It will be noted in the above figures that an unusually large amount of permanent channelling was done. This follows on a decision taken some time ago that the replacing of the many small open ditches in the old areas by concrete channels should be speeded up. It had been found that with the constant clearing and cutting over a period of years these ditches had become too large and that water tended to stagnate in them. Moreover with new building going on all over the place near and even in our maintained areas it was found there was a tendency on the part of builders to look on these open ditches as of little importance. We quite frequently find them blocked or diverted and even filled up altogether resulting in the ground again becoming waterlogged. Whereas no one will venture to disturb or interfere with a concrete channel without consulting us. When an earth ditch is replaced by a properly graded channel a shower of rain will keep it clear and it only requires a minimum of attention from the maintenance gangs on their periodic rounds. It is intended, therefore, to replace in time all these open ditches by permanent concrete channels and the comparatively small outlay involved in thus making them lightly up will soon be offset by reduced maintenance charges.

Control of the salt water breeder *A. Sundaicus* was never relaxed throughout the year. It will be seen from the record of the catches in the mosquito traps, to follow later, how successful our efforts in this direction were.

Most of the land in the Kallang Basin, dangerous from the point of view of this special mosquito, is now in our own possession and, being so, its control was so much easier. Two special gangs were continuously employed in this land on various measures, all designed to render the area permanently less favourable to the breeding of this mosquito, and to reduce the amount of maintenance. Such measures included cutting and filling, levelling off inequalities, trimming the banks to present a clean cut edge to the tide, bunding off the tide where advisable or giving it freer access. For instance in one lowlying area here it was found possible to raise most of it above high tide level by sacrificing a small part. The sacrifice simply meant the excavation of the small part, using the spoil so obtained to raise the general level of the rest, while leaving the tide free access to the excavated part. In this way we reclaimed 7 acres on which it was later found possible to accommodate the charcoal burners evicted from Sin Koh Street. And considering that the land was acquired for the sole purpose of sterilising it the rental obtained from the charcoal burners is a very handsome return. It should be possible in the not too distant future to accommodate the whole of this offensive trade in this way in this district where it should cause a minimum of nuisance.

In this district, too, 2,105 yards of earth ditches were replaced by concrete channels. This was found to result in quite a saving of oil as these channels can be kept free of breeding by mere sweeping.

Owing to the extended programme it was found necessary about the middle of the year to engage more labour. At the end of the year the total labour force was distributed as follows:—

10 permanent maintenance gangs, 5 major works gangs engaged on new works, 3 special gangs engaged in *Sundaicus* control in the Whampoa, Kallang and Geylang River basins, 2 construction gangs in the Kallang Basin employed on the special work already described, and 2 other Patrol gangs engaged in special anti-mosquito and sanitary work, one in the Siglap district which is seamed with small open ditches which usually lead nowhere, and one by special arrangement in the area immediately surrounding the General Hospital in a special effort to limit "domestic" breeding.

The department also employs 20 masons with 40 labourers and coolies, 4 store coolies, 6 mosquito trap coolies, 4 tidal gate coolies, and 5 oiling units of 4 men each. The increased number of masons was necessitated by the large scale replacement of earth ditches by concrete channels already mentioned.

Three mosquito traps were in continuous use nightly throughout the year, one on the Katong sea front near the Swimming Club, one in the middle of the Kallang Basin and one in or near Tan Tock Seng Hospital. These were placed on their respective positions in order to keep a permanent check of the amount of *A. Sundaicus* breeding. In the Katong trap, which was set on 306 nights the total catch of *A. Sundaicus* was 8. In the Kallang trap also set on 306 nights the catch of this mosquito was nil, while in the Tan Tock Seng trap, set for 304 nights, one only was caught.

39,228 gallons of anti-malarial mixture were sprayed mostly in the basins of the aforementioned streams. This was a big saving on the previous year when approximately 60,000 gallons were used.

The total expenditure for the year by the Anti-Mosquito department was \$145,663.17.

As this is my last annual report the present seems an appropriate time to summarise very briefly the history, and to bring up to date the record of this now very active branch of the Health department.

Prior to 1913 the only anti-malarial work which had been carried out was experimental, and was designed in particular to deal with *A. Maculatus*, at that time breeding freely in the Radin Mas ravines in the Telok Blanga district. Following on the pandemic of malaria in 1911, Sir Malcolm Watson in a special report on Singapore town made the recommendation that certain anti-malarial measures should be taken. A Standing Committee was immediately set up and that Committee put in hand the work already mentioned in the Radin Mas ravines. The Committee was still sitting in 1913 and for some years later but from 1913 the work was gradually taken over by the Municipal Health department until it finally accepted full responsibility. And to-day Anti-malarial or rather Anti-mosquito work forms an important part of the general work of the department and a knowledge of it is an essential in the equipment and training of all our Inspectors.

For some time the work continued to be purely anti-malarial in character and was directed against *A. Maculatus*, the proved suburban district "carrier." We contented ourselves with simply subsoil piping the favourite breeding places of this mosquito, namely the clean out-cropping seepages and springs of which there were many in the hill foot land and valley floors of the country district. As the residential area extended and houses came to be built on the sides of these valleys, our methods of drainage had to be elaborated by the provision of deep ditches in the ravines to take the ordinary sullage drainage and septic tank effluents of these houses. And it was through the cutting of these deep ditches in the swampy valley floors that we learned we could dry out permanently large areas of lowlying land with the result that literally acres of permanent breeding grounds of ordinary irritative mosquitoes were automatically abolished. And in this manner, too, we learned that the mere lowering of the water table dried out many of what had previously appeared to be permanent seepages and springs, thus enabling us to cut down the excessive use of subsoil pipes which had characterised our maiden efforts.

Thus insensibly almost we passed from a purely Anti-malarial to an All-mosquito programme—from temporary drainage to permanent work until today our policy is to abolish permanently, wherever possible, the breeding places of all mosquitoes.

During the progress of the work many acres of permanent swamps have been dried out and several thousands of ponds and shallow wells either filled or drained dry. And it may now be said that the whole of the Municipal area from Thomson Road to Telok Blanga Road and extending to the limits has been permanently treated and drained from an all-mosquito point of view. Work is proceeding rapidly in the small remaining sector embracing the watershed between the Whampoa and Kallang rivers. That should be completed in like manner within a few years when it may be said that all permanent breeding places for all mosquitoes, generally speaking, have been abolished.

Very briefly since the beginning to date a total length of 108 miles of subsoil pipes has been put down, and 57 miles of concrete channels, of varying size inverts, constructed. There are, in addition, upwards of 40 miles of earth ditches which as already indicated will be replaced in concrete in the next few years. These works are scattered over the whole Municipality in 160 different areas each for record purposes with its own distinctive name and number, and all under permanent maintenance.

One last note—when I say above all mosquitoes I must make one exception. I refer to that purely domestic breeder, *Stegomyia*. Though perhaps not quite so prevalent as it was some years ago, it is still breeding freely in most houses and compounds. It is no exaggeration to say that in 99% of the complaints we receive this mosquito is the culprit. The prevention of its breeding is easy but very definitely requires the co-operation of the householder. Despite the many visits of inspectors over the years and the painstaking demonstrations of how and where this mosquito breeds our efforts have met with but indifferent success, and, possibly because of our spoonfeeding methods, the necessary co-operation is sadly lacking. So far the law has not been invoked, as it was in the Panama and elsewhere. One does not wish to apply it where so many of the culprits are so ignorant. But one day, and I refer to the possible introduction of Yellow Fever to these shores, the prevention of the breeding of this particular mosquito may become a very serious and a very urgent matter. The problem is, however, easy of solution but not until the responsibility of the individual and that of the corporation have been definitely assigned. It may be costly but I repeat it will be easy and straightforward.

IX. SUPERVISION OF MIDWIVES AND INFANT WELFARE.

The report of the Lady Medical Officer is appended.

The District Sisters and Staff Nurses paid a total of 32,367 visits. Of these 16,969 were first visits representing 16,870 live mothers. 29 had died before a visit could be paid and 70 had removed. 1,682 were paid to wrong addresses of which there were 843. We failed to trace 354 mothers. 13,716 revisits were paid to 3,383 sick mothers. This is a big and a welcome increase over the figures for last year. It was found possible to do this by cutting out the visits to mothers who had been confined in hospital, after they returned to their homes. These visits were never very necessary at any time as the mothers must have had the best attention possible in the hospital, nor are they likely to be discharged or leave hospital until they are quite recovered.

Of the 16,870 mothers visited by the Staff, 13,589 were reported to be living in single rooms or cubicles.

In all 24,230 confinements were reported at the Clinics and of these 6,907 took place in hospitals. 323 were attended by private practitioners, 12,095 by Registered Midwives and 4,905 had no skilled attention at birth.

The total number of maternal deaths associated with Pregnancy, Childbirth and the Puerperal state was 132.

CLINIC AND CLINIC DISTRICT VISITING.

24,378 births were reported to the Clinics including 146 sets of twins and 1 of triplets. 20,031 of these infants were subsequently taken on the Clinic Registers. 16,398 were seen within ten days of birth, 272 were still born, 186 had died before a visit could be paid and 572 had either been removed or were being nursed out. 6,950 were born in hospitals.

In the Clinics 51,686 consultations were held and 126,475 visits were paid in the homes by the District Nurses. 1,491 patients were sent to hospital, 709 as in-patients and 782 as out-patients.

MUNICIPAL MIDWIVES.

They attended 2,142 cases including 649 confinements, 3 miscarriages and 1,473 post natal cases where it was found there had been no skilled attention at birth and no registered midwife in attendance. 17 cases with complication were sent to hospital, and Panel doctors were called to attend another 78, also with complication and who were too poor to engage the services of a medical man.

The total number of visits paid by the four Municipal midwives was 8,610.

ANTE NATAL WORK.

This was a new departure. It bids fair to be very popular. 801 pregnant mothers took advantage of these special clinics. On them 2,760 consultations were held and 1,799 visits were paid in the homes, 100 were sent to hospital for treatment, 46 as in-patients and 54 as out-patients.

As already mentioned the special treatment given in the Clinics to these post natal cases was directed mainly against Congenital Syphilis and Beri-Beri. The results, though naturally the numbers are small, are already very interesting and the details should be read in the special report of the department.

X. FOOD AND MARKETS.

The report of the Food and Market Inspector is appended.

Wet fish sales were 14% under last year's figures. This is entirely accounted for by the difficulty of marketing Japanese caught fish.

In the market approximately 62 tons of unsound foodstuffs were seized or surrendered. A further 32 tons from shops and stores in the town were similarly dealt with, and all were sent to the Incinerator for destruction or otherwise properly disposed of.

FOOD SHOPS ETC.

Licences were issued for:—

			1938	1937
Eating Houses	..	..	1,041	996
Coffee Shops	..	..	172	178
Soda Fountains	..	..	44	40
Meat and Fish Shops	..	..	160	157
Bakeries	..	..	22	22

Cake Shops	..	..	..	36	34
Biscuit Factories	..	..	..	5	5
Aerated Water Factories	..	..	..	8	8
Dairy Shops	..	..	..	2	—
Milk Vendors	..	..	..	215	213
Iced Water and Cold Drinks	..	..	..	109	48
Food Caterers	..	..	..	2	2
Food Shops	..	..	..	11	11

All were regularly inspected by the District Sanitary Inspectors.

XI. PLACES OF PUBLIC RESORT.

Theatres, Hotels, Public Houses, Schools, Dental establishments etc. were regularly inspected and the necessary reports submitted at the request of the several licensing authorities.

XII. SLAUGHTER HOUSES.

During the year 321,596 animals were slaughtered in the Municipal Abattoirs. These were distributed as follows, the 1937 figures being given for comparison:—

			1938	1937
Pigs	..	..	268,719	269,560
Sheep	..	..	35,246	32,510
Goats	..	..	3,688	4,463
Oxen	..	..	13,866	17,375
Buffaloes	..	..	77	94
Total	..	..	321,596	324,002

1,956 carcasses were totally condemned, 1,651 being pigs, 110 sheep, 49 goats, 145 oxen and 1 buffalo. Of the pigs, 841 were suffering from *Cysticercus Cellulosae*, 355 from *Pyrexia*, 106 from *Swine Fever* and 24 from generalised tuberculosis. Of the oxen 11 were suffering from *Cysticercus Bovis*, 29 from *Tuberculosis* and 82 from pathological emaciation.

There was evidence of *Tuberculosis* in the carcasses of 1,154 Pigs and 100 Oxen.

Following my representations during the preparation of the Budget sanction was given to augment the staff of skilled meat inspectors, and two more will be appointed this year bringing the total to seven.

XIII. OFFENSIVE TRADES.

444 licences, 335 of them for laundries were issued during the year, the fees collected being \$3,564.89. All these licensed premises were subject to the usual routine inspection.

XIV. BURIAL GROUNDS.

There were 10,214 burials inside Municipal limits during the year the nationalities being as follows:—

Europeans	..	..	60
Eurasians	..	..	99
Chinese	..	..	8,015
Malays	..	..	1,410
Indians	..	..	605
Others	..	..	25
			<hr/>
			10,214
			<hr/>

There were 25 exhumations during the year, carried out under the supervision of the Burial Ground Inspector. The same officer paid 1329 visits of inspection to Municipal and other cemeteries.

There were 117 cremations.

Of the total burials above 9,170 took place in the 6 Municipal Cemeteries and the rest in the 14 Private and 17 Public Cemeteries still in use.

XV. STAFF.

Dr. Canton, Deputy Health Officer, returned from Home leave in August, Mr. Willgress, Analyst in June and Mr. MacMahon, Food and Market Inspector in November. Dr. Gilmour, Bacteriologist, went on leave in October.

Dr. Lee Ee Kiam was appointed Assistant Bacteriologist, a new appointment, as from the beginning of the year.

Miss MacMurray, Matron Middleton Hospital, retired in July and Mrs. Auten was appointed to succeed her.

Miss Stevens, Infant Welfare Department, returned from home leave in October.

Probationary Inspectors Valberg and Taye were successful in obtaining the diploma of the Royal Sanitary Institute.

HEALTH OF SUBORDINATE STAFF.

The number of cases treated in the Dispensary was 26,597. There were 545 cases sent to hospital and 214 to various clinics. 412 were treated by private practitioners. 64,120 days sick leave were granted, 33,663 dressings were applied and the daily attendances at the dispensary totalled 64,312.

612 examinations for physical fitness were carried out and 161 persons were inoculated against Typhoid.

The chief causes of invaliding were Influenza (7567), Accidents and Injuries (4898), Pyrexias (2662), Myalgias and Neuralgias (1611), Bronchitis (1465) and Inflammation and Abscesses (994).

There were only 124 first attacks of malaria.

XVI. GENERAL.

There were 3,155 notices including 535 intimations served during the year. 1,788 notices were brought forward from the previous year,

making a total of 4,943. Of these 3,680 were complied with, 112 were cancelled and 1,151 carried forward.

There were 57,110 visits of Inspection paid by the Sanitary Inspectors, 1,665 prosecutions, 1,466 convictions with fines imposed amounting to \$8,196 while 88 prosecutions were withdrawn and 111 summonses could not be served.

The following reports and returns are appended:—

Anti-Mosquito Report.
Report of the Analyst.
Report of the Bacteriologist.
Report of the Infant Welfare Department.
Report of the Superintendent Middleton Hospital.
Report of the Market Inspector.
Report of the Superintendent Abattoirs.
Chief Sanitary Inspector's returns.

In bidding farewell I wish once again to express my deep appreciation of the unfailing loyalty that has always been accorded to me during my term of office by every member of the department from the highest to the lowest. I am confident that every one of them has the best interests of the department at heart and that the same loyalty will be given to my successor.

I have the honour to be,

Sir,

Your obedient servant,

P. S. HUNTER,

C.B.E., M.A., M.B., Ch.B., D.P.H.,

Municipal Health Officer.

MUNICIPAL HEALTH OFFICE,

Singapore, 25th March, 1939.

The Municipal Health Officer,

Singapore.

Sir,

I have the honour to forward the following report on Anti-mosquito measures carried out in the Municipal Area during the year 1938.

**ALTERATION IN NUMBERING OF THOMPSON ROAD RAVINES
(AREAS No. 141 & 142 THOMPSON ROAD).**

In order to simplify the system of numbering employed to identify the numerous Ravines off Thompson Road it was considered advisable to alter Area No. 141 Thompson Road Ravine No. 2, and Area No. 142 Thompson Road Ravine No. 3, mentioned in the Anti-mosquito report for 1937 to Area No. 141 Thompson Road Ravine No. 5, and No. 142 Thompson Road Ravine No. 2 respectively.

NEW ANTI-MALARIAL WORKS.

New works were carried out in the following areas:—

- Area No. 153, St. Michaels Road.
- „ 154, Thompson Road 4 (Toa Payoh Road).
- „ „ 155, Thompson Road 1 (Hill cutting).
- „ „ 156, Thompson Road 3.
- „ „ 157, Alkaff Avenue.
- „ „ 158, Jalan Datoh.
- „ „ 159, Kampong Sambau.
- „ „ 160, Kampong Martin.

AREA No. 153—ST. MICHAEL'S ROAD.

A. *sundaicus* larvae were collected in several places in a small tidal creek off the Kallang River. This tidal creek runs from the Kallang River to St. Michael's Road near the M.C. water pipe line.

The area was cleared of mangrove and levelled off. A tide gate was constructed and the bank of the river raised to form a bund. A deep ditch was cut through the lowest portion of the creek leading to the tide gate. The area was then left to dry out. The earth ditch was replaced later by an open invert concrete channel laid on baku rollers. Outcropping seepages from the sandy slope at the head of the creek were dealt with by subsoil piping.

500 feet of eight inch, 610 feet of six inch subsoil pipes, 182 feet of twenty-one inch, 146 feet of eighteen inch, 110 feet of fifteen inch, 84 feet of nine inch concrete inverts and 559 eighteen inch revetment slabs were laid.

AREA NO. 155—THOMPSON ROAD NO. 1.

A. maculatus larvae were found in seepages outcropping where earth cutting work had been done in a hill near the Sungei Whampoe, opposite the Police Depot playing ground in Thompson Road. An open invert concrete channel was laid throughout the length of the cutting and the seepages were dealt with by subsoil piping discharging into this drain.

496 feet of twelve inch concrete inverts, 1,041 feet of four inch subsoil pipes were laid.

AREA NO. 154—THOMPSON ROAD NO. 4.

This ravine runs into Thompson Road close to its junction with Toa Payoh Road. A. maculatus larvae were collected in the head of the ravine. The ravine floor was cleared and cocoanut and rubber trees removed where necessary. The main stream bed was deepened and straightened and replaced by an open invert concrete channel, outcropping seepages were subsoil piped.

Six wells were closed. 1,174 feet of twenty-one inch, 94 feet of eighteen inch, 144 feet of fifteen inch, 154 feet of twelve inch concrete inverts, 1,024 of eighteen inch revetment slabs, 1,011 feet of six inch and 358 feet of four inch subsoil pipes were laid.

AREA NO. 156—THOMPSON ROAD NO. 3.

This short ravine, off Thompson Road, is situated in the Rubber plantation opposite the entrance to Giang Thye Road. The Ravine floor was cleared. The stream bed was deepened and replaced by an open invert concrete channel. Permanent seepages were trapped by subsoil piping.

258 feet of fifteen inch concrete inverts, 254 of eighteen inch revetment slabs and 760 six inch subsoil pipes were laid.

AREA NO. 157—ALKAFF AVENUE.

This area lies between Upper Serangoon Road and Alkaff Avenue. A large swamp in which mosquitoes were breeding in large numbers was dealt with by deepening the Alkaff Avenue roadside drain and cutting an earth ditch, parallel to Upper Serangoon Road, through the centre of the swamp. 1,500 yards of earth drains were cut.

AREA NO. 158—JALAN DATOH RAVINE.

This ravine lies north of the Sungei Whampoe, between Thompson Road and Ah Hood Road. The cart track which runs east from Thompson Road close to and parallel to the Sungei Whampoe is the easiest means of access to the ravine. A large number of ponds were situated in the ravine floor and dangerous seepages were outcropping at the head.

An earth ditch was cut from the Sungei Whampoe to the head of the ravine and this was later replaced by an open invert concrete channel. A fifteen inch culvert, 12 feet long, was laid under the cart track to enable the drain to discharge into the Sungei Whampoe.

By the end of the year the following permanent works had been completed. 400 feet of eighteen inch concrete inverts and 350 eighteen inch revetment slabs had been laid. Work is still in progress.

AREA NO. 159—KAMPONG SAMBAU.

This area lies between Sambau Street and the sea. Numerous mosquitoes were breeding in the large network of inefficient earth drains which traversed this lowlying piece of land.

The main earth ditches were deepened and replaced by open invert concrete channel and numerous unnecessary earth drains and one pond were filled in.

584 feet of twelve inch open invert concrete channel was laid by the end of the year. Work is still in progress.

EXTENSIONS AND NEW WORKS IN EXISTING AREAS.

AREA NO. 142—THOMPSON ROAD NO. 2.

This area is referred to in the 1937 Anti-Malarial Report as Thompson Road No. 3. As already mentioned it was considered desirable to alter the name of this ravine to Thompson Road No. 2. Before the end of 1937 an earth ditch had been cut throughout the length of this ravine. This year the ditch was replaced by an open invert concrete channel and permanent outcropping seepages were dealt with by subsoil piping. Six large trees and some smaller ones had to be removed in order to lay effectively the subsoil pipe lines.

250 feet of twenty-one inch, 256 feet of eighteen inch, 216 feet of fifteen inch, 160 feet of twelve inch concrete inverts, 710 revetment slabs and 230 feet of six inch subsoil pipes were laid.

AREA NO. 1—ANDERSON ROAD.

The subsoil pipe lines, which had drained this area for many years, were rendered useless by extensive filling operations over the greater portion of the area.

Dangerous seepages, which appeared at the foot of the hill, were trapped by subsoil pipes which were led to discharge into a newly constructed open invert concrete channel running along the toe of the slope.

472 feet of twelve inch concrete inverts, 424 eighteen inch revetment slabs and 317 feet of four inch subsoil pipes were laid.

AREA NO. 4—CLAYMORE.

Existing earth drains in this area were replaced by open invert channels. 1,128 feet of twelve inch concrete inverts were laid.

AREA NO. 5—CLUNY RAVINE.

An eight inch subsoil pipe line, which had become choked by tree roots, was replaced by an open invert concrete channel leading to the head of the main channel.

220 feet of twelve inch concrete inverts and 20 feet of eight inch subsoil pipes were laid. 30 revetment slabs, 68 feet of fifteen inch, 36 feet of eighteen inch, and 10 feet of twenty-one inch concrete inverts were laid to replace worn out portions of the main Anti-malarial drain in this area.

AREA NO. 7—GLENCAIRD.

An earth ditch between Glencaird Anti-malarial drain and Wayang Satu Police Quarters was replaced by an open invert concrete channel.

534 feet of twelve inch concrete inverts and 20 revetment slabs were laid.

In the main Anti-malarial drain, 40 feet of eighteen inch channel and 4 revetment slabs were replaced.

AREA NO. 22—JERVOIS ROAD NO. 3.

The earth drains in this area were replaced by open invert concrete channels. 1,430 feet of eighteen inch, 1,376 feet of fifteen inch concrete inverts and 214 eighteen inch revetment slabs were laid before the end of the year. Work is still in progress.

AREA NO. 35—TIONG BAHRU.

To reduce oiling and maintenance costs and to deal more effectively with irritative mosquito breeding places, the numerous existing earth drains which receive storm water, and sullage drainage from groups of squatters' huts were replaced by open invert concrete channels. Depressions in the ground surface liable to retain water were drained or levelled off. Work is still in progress.

146 feet of eighteen inch, 1,142 feet of fifteen inch, 4,830 feet of twelve inch concrete inverts, 1,504 eighteen inch concrete revetment slabs, 1,330 feet of six inch, 36 feet of eight inch and 4,357 feet of four inch subsoil pipes were laid.

AREA NO. 49—SWETTENHAM ROAD.

The concrete drain from No. 26, Ridout Road, Municipal property, was diverted and relaid as an anti-malarial channel on a new line in order to enable dangerous seepages to be dealt with.

304 feet of twelve inch open invert concrete channel, 13 eighteen inch revetment slabs and 310 feet of four inch subsoil pipes were laid.

AREA NO. 54—TANGLIN HILL NO. 2.

The Anti-malarial earth ditch from Kay Siang Road to the Singapore River was replaced by an open invert concrete channel.

564 feet of twenty-one inch, 15 feet of eighteen inch concrete inverts and 830 eighteen inch revetment slabs were laid.

AREA NO. 88—JEWISH CEMETERY RAVINE.

New dangerous cutcropping seepages at the toe of the slope near the Turf Club Stables were dealt with by laying 450 feet of four inch subsoil piping and 62 feet of nine inch open invert concrete channel.

AREA NO. 91—HOLLAND ROAD—BUKIT TIMAH ROAD.

Owing to the rapid development of this area and the finding of *A. maculatus* larvae in wells and seepages in the subsidiary ravines, the main anti-malarial earth ditches in the three subsidiary ravines were replaced by open invert concrete channels and outcropping seepages were dealt with by subsoil piping. Later when water stand-pipes were provided for the use of the squatters in these ravines all earth wells, 15 in number, were closed.

3,334 feet of eighteen inch, 156 feet of fifteen inch, 344 feet of twelve inch concrete inverts, 2,912 eighteen inch revetment slabs, 3,586 feet of six inch and 1,939 feet of four inch subsoil pipes were laid.

Minor repairs to the main concrete Anti-malarial channel were carried out, 4 twenty-one inch, and 5 eighteen inch concrete inverts and 112 eighteen inch revetment slabs being used.

Work is still in progress.

AREA NO. 68—PEARL'S HILL.

Early in the year, in the course of a larval survey in this area, dangerous seepages were found oozing out through a concrete retaining wall at the rear of the new Sikh barracks in New Bridge Road. Some of these seepages appeared some little distance up the wall and others were at ground level the water flowing over the concrete pavement which covered the ground between this retaining wall and a sillage drain at the rear of the Barracks. The seepages outcropping at ground level were dealt with by laying a subsoil pipe line in a narrow trench cut through the concrete pavement from the sillage drain to the wall and thence along the toe of the wall. In places where seepages outcropped some distance up the retaining wall, in addition to the subsoil pipe line mentioned above, a false small wall was constructed about a foot away from the main retaining wall (rising above the point where seepages outcropped) and the space between was filled in with broken brick.

In this area further dangerous seepages were found behind the barrack block sited on the hill slope facing People's Park Market. They were dealt with by subsoil piping.

An existing subsoil pipe line and concrete channel along the toe of the hill near the old railway track were repaired where necessary.

540 feet of six inch, 490 feet of four inch, and 242 feet of three inch subsoil pipes were laid in the area.

AREA NO. 130—MOUNT WASHINGTON.

In this area at the extreme head of the main ravine *A. maculatus* larvae were breeding in an old disused granite quarry. The small collection of water in which the larvae were found was fed with seepage-water dripping from interstices in the quarry wall. These dangerous seepages from the rock face were dealt with by utilising the blocks of granite found on the site to construct a false wall close to the quarry wall face and cemented to it at the edges so as to enclose completely the

outcropping seepages. At the bottom of the recess between the false wall and the granite slope a subsoil pipe line was laid to receive the outcropping seepage-water and lead it to the main channel.

In one place above and behind the top of the quarry wall there was a small pond fed by a spring. The pond was filled in with earth and a sufficiently deep passage way cut in the quarry wall to allow of the trapping of the spring by subsoil pipes. From the passage way cut in the wall of the quarry to the quarry floor a distance of some 20 feet the subsoil pipe line was cemented to the quarry wall face and then led to discharge into the main drain by way of a subsoil pipe line laid in the quarry floor.

515 feet of eight inch and 67 feet of six inch subsoil pipes were laid.

Repairs were also carried out in the main channel, 150 feet of eighteen inch concrete inverts, 25 eighteen inch revetment slabs and 25 feet of four inch subsoil pipes being used.

AREA NO. 105—BUKIT PURMEI.

Draining into the main drain in this area a new length of Anti-malarial concrete channel was laid along the railway line near Kampong Bahru Road to allow of the discharge of new seepages which were trapped by subsoil pipes at the toe of the railway line cutting.

30 feet of eighteen inch concrete inverts, 50 eighteen inch revetment slabs and 875 four inch subsoil pipes were laid.

Small repairs in the main channel called for the use of 5 twenty-one inch inverts and 9 eighteen inch revetment slabs.

AREA NO. 107—WAYANG SATU.

The main work carried out in the Wayang Satu ravines during the year was directed against the breeding of irritative mosquitoes in minor earth drains which received storm water, and the sullage drainage from groups of squatters' huts. The essential earth drains were deepened and replaced by open invert concrete channels. Unnecessary earth drains were filled in.

24 feet of eighteen inch, 1,028 feet of fifteen inch, 1,476 feet of twelve inch and 2,502 feet of nine inch concrete inverts, 32 eighteen inch revetmet slabs and 373 feet of four inch subsoil pipes were laid.

Minor repairs to the main Anti-malarial channel necessitated the laying of 530 feet of eighteen inch concrete channel, 89 eighteen inch revetment slabs and 20 feet of four inch subsoil pipes.

AREA NO. 108—BERLAYER VILLAGE RAVINE.

The extensive earth filling operations carried out by the Singapore Harbour Board in these ravines necessitated the removal of our Anti-malarial channel from the floor of one ravine. When the filling operations had been completed, an open invert concrete channel was laid by the

Singapore Harbour Board along the toe of the hill slopes. New outcropping seepages were dealt with by us, 530 six inch and 193 four inch subsoil pipes being used.

AREA NO. 109—MOUNT PLEASANT.

Dangerous outcropping seepages along the toe of the slope beneath house No. 168, Mount Pleasant Road, were dealt with by laying 722 feet of four inch and 30 feet of six inch subsoil pipes and 90 feet of nine inch open invert concrete channel.

Repairs carried out on the main Anti-malarial channels in this area entailed the relaying of 80 feet of twenty-one inch, 150 feet of eighteen inch, 8 feet of twelve inch inverts, 106 eighteen inch and 20 fifteen inch revetment slabs.

AREA NO. 113—KHEAM HOCK ROAD RAVINE.

The existing anti-malarial earth drain in this area was replaced by an open invert concrete channel.

280 feet of fifteen inch, 920 feet of twelve inch concrete inverts and 200 eighteen inch concrete revetment slabs were laid.

AREA NO. 116—SUNGEI WHAMPOE.

360 feet of twelve inch open invert concrete channel was laid through the plank and attap kampong at St. George's Road.

AREA NO. 114—DUNEARN ROAD.

The existing Anti-malarial earth drain in this area was replaced by an open invert concrete channel.

1,492 feet of eighteen inch, 312 feet of fifteen inch, 722 feet of twelve inch, 756 feet of nine inch concrete channel, 1,276 eighteen inch revetment slabs and 270 feet of six inch subsoil pipes were laid.

AREA NO. 117—TELOK BLANGAH RAVINE.

The earth ditch connecting the lower end of the Anti-malarial drain in this ravine with the Telok Blangah Road side drain was replaced by an open invert concrete channel. *A. maculatus* larvae were found breeding in this earth ditch which had been scoured out to a depth of 15 feet in places. The sides of the drain were terraced and sufficient earth was obtained on the site to bring the invert of the new concrete drain up to the required level. In order to prevent the too rapid flow of storm water the drain was stepped down in four places.

620 feet of twenty-one inch and 180 feet of twelve inch concrete inverts, 655 eighteen inch revetment slabs, were laid.

60 feet of twelve inch concrete inverts and 7 eighteen inch revetment slabs were replaced in the main existing channel.

AREA NO. 132—BUGIS ESTATE.

The Anti-malarial ditch running close to and parallel to Kheam Hock Road which drained ravine No. 2 on the Bugis Estate off Kheam Hock

Road, at the rear of the newly erected residence of His Excellency, the General Officer Commanding, was replaced by an open invert concrete channel.

A. maculatus and *A. karwari* larvae were collected from seepages appearing at the edges of the ornamental pond in Ravine No. 1 in this area. An eighteen inch culvert 60 feet long was laid under the approach road which runs between the pond and the main Anti-malarial channel to allow of drainage of the pond. The earth from a small island in the centre of the pond was used to raise the general level of the pond floor and an open invert concrete channel was constructed through the centre of the floor of the pond site to the culvert and from the culvert to the main anti-malarial drain. Seepages were dealt with by subsoil piping. Four wells were closed.

2,474 feet of eighteen inch, 208 feet of twelve inch, 40 feet of nine inch concrete channel, 2,522 eighteen inch revetment slabs, 150 feet of eight inch, 300 feet of six inch and 1,646 feet of four inch subsoil pipes were laid.

AREA NO. 133—KALLANG BASIN.

To eliminate permanently as far as possible *A. sundaicus* breeding in this area temporary extra labour was engaged during the year. To allow of freer access of the tide, the existing breaches in numerous bunds which formerly enclosed ponds were enlarged.

The edges of the islands and former bunds in the tidal area were clean cut and the earth obtained from these cutting operations was used to fill up inequalities in the surface of the land where brackish water could stagnate.

The replacement of the main earth ditches leading to the tide gate by permanent channels was also put in hand.

North of the disused cemeteries between Lorongs 1 & 3 permanent outcropping seepages were dealt with by laying a subsoil pipe line.

220 feet of eighteen inch, 1,950 feet of fifteen inch, 3,454 feet of twelve inch, 690 feet of nine inch concrete channel, 675 feet of eight inch and 125 feet of six inch subsoil pipes were laid. Work is still in progress.

AREA NO. 136—BOON TECK RAVINE.

Work was commenced during the year to deal permanently with the drainage of this ravine.

The existing anti-malarial ditch from the Sungei Whampoe to the head of the ravine was replaced by an open invert concrete channel. Subsoil pipe lines and contour open invert concrete channels were laid where necessary to deal with outcropping seepages from the hill slopes at the sides of the ravine. Many unnecessary earth drains running across the wide valley floor were filled in. Five old pond sites were filled in and levelled off. A re-inforced concrete culvert 10 feet diameter and 20 feet long had to be constructed under the approach road to the cemetery to permit the free discharge of the drainage from the ravine to the Sungei Whampoe.

2,334 feet of twenty-one inch, 1,446 feet of eighteen inch, 400 feet of fifteen inch, 816 feet of twelve inch, 300 feet of nine inch concrete channel, 3,863 eighteen inch revetment slabs were laid. Work is still in progress.

AREA NO. 148—UPPER SERANGOON ROAD RAVINES.

This area embraces all the ravines in the district bounded by Woodleigh, Upper Serangoon Road and the Municipal Limit. With the exception of the head of one ravine near Upper Serangoon Road which it was found necessary to deal with semi-permanently during the year, no Anti-malarial work has been carried out in this area to date.

A. maculatus breeding grounds in the head of the ravine near Upper Serangoon Road were dealt with during the year by laying 700 feet of six inch and 700 feet of four inch subsoil pipes.

AREA NO. 81—MOUNT ROSIE RAVINE.

A short ravine below Chancery House was cleared and drained by laying 580 feet of nine inch concrete channel, 150 feet of eight inch and 15 feet of six inch subsoil pipes.

REPAIRS AND MINOR EXTENSIONS.

During the year minor extensions and repairs were carried out in existing areas as follows:—

Area No. 100, Adam Park—58 feet of twenty-one inch, 798 feet of eighteen inch and 40 feet of fifteen inch concrete inverts, 167 eighteen inch revetment slabs, 38 feet of six inch and 83 feet of four inch subsoil pipes were re-laid.

Area No. 27, One Tree Hill—675 feet of six inch subsoil pipes were laid.

Area No. 42, Grange Road—162 feet of six inch subsoil pipes were laid.

Area No. 56, Henderson Road—152 feet of eighteen inch inverts and 12 eighteen inch concrete slabs were relaid.

Area No. 81—Mount Rosie—40 feet of twenty-one inch, 240 feet of eighteen inch and 160 feet of twelve inch concrete inverts, and 723 eighteen inch concrete revetment slabs were relaid.

Area No. 115, Alexandra Road—134 feet of twenty-one inch, 62 feet of eighteen inch, 30 feet of fifteen inch concrete inverts, 16 eighteen inch revetment slabs and 329 feet of four inch subsoil pipes were relaid.

Area No. 134, Bendemeer—The whole length of the bund in this area was raised 1 foot.

Area Gunong Pulai—730 feet of twelve inch open invert concrete channel, 73 feet of eight inch, 300 feet of six inch and 260 feet of four inch subsoil pipes were laid.

Minor repairs in other existing Anti-malarial areas called for the laying of 264 feet of twenty-one inch, 318 feet of eighteen inch, 948 feet of twelve inch, 172 feet of nine inch concrete inverts, 571 eighteen inch revetment slabs, 7 feet of eight inch, 265 feet of six inch, 677 feet of four inch subsoil pipes.

OILING.

39,298 gallons of Anti-malarial mixture were used, principally in the Kallang, Geylang, and Sungei Whampoe areas and the head of the Singapore River.

MAINTENANCE.

Routine maintenance consisting of clearing and grass cutting was carried out in all of the existing Anti-malarial areas.

MOSQUITO SURVEYS.

Systematic surveys of the M.C. area were regularly carried out and 2,485 collections of mosquito larvae were examined and identified in the laboratory.

Collections of adult mosquitoes were made during the year by means of mosquito traps. 112 male and 192 female Anopheline mosquitoes were caught. Of these 138 were dissected but none was found infected. In addition, 5,707 adult mosquitoes were identified.

The following table shows the numbers and various species of female Anopheline mosquitoes trapped during the year at Tan Tock Seng Hospital, Katong Sea front and Kallang Basin:—

TABLE I.

Place of Trapping	Number of nights the traps were set	SPECIES					
		Sundaicus	Umbrosus	Hycanus	Vagus	Kochi	Total
Tan Tock Seng Hospital ..	304	1	0	2	78	9	90
Katong Sea front ..	306	8	0	1	3	0	12
Kallang Basin ..	306	0	1	3	85	1	90

The average numbers of *A. sundaicus* trapped per day per month in 1936, 1937 and 1938 in the Kallang Basin and at the Katong Sea front are shown in the following table:—

TABLE II.

	KALLANG BASIN			KATONG SEA FRONT		
	1936	1937	1938	1936	1937	1938
January ..	—	0.16	0.00	17.04	0.72	0.00
February ..	—	0.14	0.00	10.43	0.47	0.08
March ..	—	0.00	0.00	0.20	1.91	0.11
April ..	13.25	0.81	0.00	1.36	2.73	0.00
May ..	18.00	2.21	0.00	1.80	1.08	0.00
June ..	—	0.54	0.00	1.33	0.16	0.00
July ..	3.36	0.21	0.00	0.60	0.00	0.00
August ..	2.72	0.23	0.00	1.12	0.03	0.00
September ..	6.60	0.31	0.00	3.03	0.48	0.03
October ..	1.08	0.28	0.00	0.60	0.28	0.08
November ..	1.00	0.29	0.00	1.79	1.25	0.04
December ..	—	0.08	0.00	2.41	0.74	0.00

In the above table, a hyphen is used to indicate that no trapping was done during that month.

It should be noted that the sites of the traps in the Kallang Basin and Katong Sea front have not been altered since trapping was started in 1936.

The number of nights the traps were set and the number of *A. sundaicus* trapped per month in 1936, 1937 and 1938 in the Kallang Basin and at the Katong Sea front are shown in the following table:—

TABLE III.

	KALLANG BASIN			KATONG SEA FRONT		
	Number of <i>A. Sundaicus</i> mosquitoes caught			Number of <i>A. Sundaicus</i> mosquitoes caught		
	1936	1937	1938	1936	1937	1938
January ..	— (—)	3 (19)	Nil (25)	375 (22)	18 (25)	Nil (25)
February ..	— (—)	3 (21)	Nil (24)	240 (23)	10 (21)	2 (24)
March ..	— (—)	Nil (24)	Nil (27)	5 (25)	46 (24)	3 (27)
April ..	53 (4)	21 (26)	Nil (24)	30 (22)	52 (19)	Nil (24)
May ..	144 (8)	53 (24)	Nil (27)	45 (25)	26 (24)	Nil (27)
June ..	— (—)	13 (24)	Nil (25)	32 (24)	4 (24)	Nil (25)
July ..	37 (11)	5 (24)	Nil (26)	15 (25)	Nil (24)	Nil (26)
August ..	68 (25)	6 (26)	Nil (27)	28 (25)	1 (26)	Nil (27)
September ..	152 (23)	8 (26)	Nil (26)	79 (26)	12 (25)	1 (26)
October ..	26 (24)	7 (25)	Nil (25)	15 (25)	7 (25)	2 (25)
November ..	3 (3)	7 (24)	Nil (25)	43 (24)	30 (24)	1 (25)
December ..	— (—)	2 (23)	Nil (25)	29 (12)	17 (23)	Nil (25)

In the above table the numbers in brackets show the number of nights the traps were set each month, and a hyphen is used to indicate that no trapping was done during that month.

(D-70)

GENERAL ANTI-MOSQUITO WORK.

271,033 yards of earth drains were cleaned and regraded by patrol gangs, and these gangs collected and disposed of 6,572 large baskets of empty tins.

241 Notices under the Destruction of Mosquitoes Ordinance were served during the year.

Control of Domestic Mosquito Breeding.

Mosquito larvae were found in 6,737 houses and compounds or 11.9% of all houses inspected for mosquito breeding.

128 complaints regarding nuisance from mosquitoes were investigated and mosquito breeding was found in the complaints' houses in 69 instances and in the property of the neighbours in 59 instances.

I have the honour to be,

Sir,

Your obedient servant,

N. A. CANTON,

Deputy Health Officer.

Chemical Laboratory,

Singapore, 10th February, 1939.

The Municipal Health Officer,

Singapore.

Sir,

I have the honour to report on the work done in the Chemical Laboratory during the year 1938.

The total number of samples analysed was 19,690 and these samples can be classified as follows:—

Public Water Supply	{	Routine samples from Singapore Island	7,527
		Routine samples from Johore ..	2,902
Sewage Purification	{	Routine and special samples from Sewage Purification Works ..	4,476
		Samples from House Installations	428
Foods, Drugs and Miscellaneous samples	{	Health Department samples ..	3,220
		Engineering Department samples	287
		Electrical Department samples ..	423
		Water Department samples ..	71
		Gas Department samples ..	349
		Other Departments	7

These figures represent a record number since the laboratory came into being in 1908 and is forty per cent higher than the 1937 figures. The increases are mainly in routine water and sewage samples but a considerable increase has also taken place in samples from the Health Department.

MUNICIPAL WATER SUPPLY.

The sources of supply of raw water were Peirce and MacRitchie impounding reservoirs on Singapore Island and Sultan Ibrahim and Pontian impounding reservoirs in Johore. The Peirce reservoir water was treated at Woodleigh and the MacRitchie reservoir water at Bukit Timah Road. The waters from both reservoirs in Johore were treated at Pulai, Johore.

An average of 20,984,000 gallons of water per day was used during the year, an increase of nearly 11 per cent on the average for 1937. Practically one half of this water came from Johore supplies. The characters of the raw waters from all the impounding reservoirs are very similar and show no appreciable alterations from the previous year. The methods of treatment used were the same as described in my last report but at the Bukit Timah Road plant the water received double filtration through two series of slow sand filters.

The mixed water which reaches the town is checked by regular analyses of tap water taken from taps in use in three different parts of Singapore. The chemical quality and physical characteristics of the water were excellent.

The samples received daily for analysis were drawn from every part of the purification system. The averages and ranges of analyses of the various raw waters are shown in detail in TABLE A at the end of this report, TABLE B gives the complete analyses of the pumped waters taken from the Pulai and the Woodleigh clear water tanks and TABLE C gives the complete analyses of two tap supplies in the town.

SEWAGES, EFFLUENTS ETC. FROM THE SEWAGE DISPOSAL WORKS.

The whole of the sewage, with the exception of that treated in house installations, was dealt with at Alexandra Road Disposal Works. The nightsoil was pumped during the whole of the year through a pipe line to the Disposal Works for separate treatment. The average daily volume of water-borne sewage treated was 5,914,000 gallons and of nightsoil 33,000 gallons per day.

The strength of the water-borne sewage was approximately the same as for the previous year and 68.7 per cent of this sewage reached the Sewage Purification Works between the hours of 7 a.m. and 7 p.m. daily.

The detritus tanks are designed to take out the heavier particles of mineral matter from the sewage, which passes on into sedimentation tanks, comprising one "Dorr" tank of capacity 480,000 gallons and six "Upward flow" tanks of total capacity 300,000 gallons. Part of the effluent from these sedimentation tanks is treated in the experimental bio-flocculation unit before filtration, and the remainder passes direct to the filters. Unused sludge from the bio-flocculation unit pumped to the crude sewage inlet well makes the suspended solids higher at the outlet than the inlet of the detritus tank.

The detritus and sedimentation tanks reduced the suspended matter in the sewage treated from 42.0 to 15.6 parts per 100,000 resulting in a retention of 62.9% of solid matter.

The Dorr tank treated 50.4% of the sewage, abstracting 62.1% of the suspended matter, and the Upward Flow tanks 49.6% of the sewage abstracting 63.8%. Taking into account the relative capacities, the ratio of the period of sedimentation in the Dorr and Upward Flow tanks is 1.2 to 1. Thus, a smaller proportion of solids settled out in the Dorr tank, in spite of 20% longer sedimentation.

The percolating filter beds again worked satisfactorily through the year, producing an even better effluent, with a much lower oxygen demand, than in the previous year.

The bio-flocculation unit treated approximately 8.44% of the effluent from the sedimentation tanks. The action of this unit was explained in the last report and, except for the first two months of the year, the unit worked satisfactorily, abstracting 63.3% of the solid matter in the sewage effluent from the sedimentation tanks and the effluent from the unit contained 5.9 parts per 100,000 only of solid matter in suspension.

TABLES D and E attached give the averages and ranges of the analyses carried out on sewages and effluents from various parts of the purification plant.

SEWAGE EFFLUENTS FROM HOUSE INSTALLATIONS.

Excluding the Military and Government installations, which the Municipality does not inspect, there were 111 purification plants in use, including four maintained by the Singapore Harbour Board. All these plants were inspected and sampled at regular intervals (in most cases four times during the year) and the following averages of the analyses carried out (excluding abattoir and cattle shed tanks) show that the results obtained are even better than the excellent results of the previous year.

Parts per 100,000		Effluent from 100 Municipally controlled House purification plants	
Free and saline ammonia	0.68
Albuminoid ammonia	0.09
Oxygen absorbed in 4 hours	0.60
Suspended matter	1.6
Chlorides as chlorine	3.7
Nitrates	1.7

The plants are remarkably free from bad smells and I think this is largely due to careful maintenance and having the filter beds covered in where found necessary.

SAMPLES FROM THE HEALTH DEPARTMENT.

The total number of samples analysed was 3,220. These samples were obtained from various sources, and include those submitted by the Sanitary Inspectors in connection with the Sale of Food and Drugs Ordinance, regular analyses of water from the Mount Emily, Y.M.C.A., Tanglin Club and Swimming Club pools, and samples brought in by members of the laboratory staff, the Health Department, and others. 1,609 Food and Drugs samples were examined, and 1,611 came under miscellaneous headings as follows:—

Well and pond waters	.. ..	.. ..	206
Swimming pool waters	.. ..	.. ..	696
Distilled water	.. ..	.. ..	1

Water from abattoirs	..	..	..	60
Other waters	..	..	..	621
Water cooling device	..	..	..	1
Disinfectants	..	..	..	2
Insecticide	..	..	..	1
Antimalarial mixture	..	..	..	1
Waterglass	..	..	..	1
Blood	..	..	..	1
Pig's stomach contents	..	..	..	3
Carbon dioxide gas	..	..	..	2
Coal	..	..	..	15
				<hr/> 1,611 <hr/>

The following table gives the details of the samples analysed under the Sale of Food and Drugs Ordinance, Chapter 191.

FOOD AND DRUGS SAMPLES.

NATURE OF SAMPLE	OFFICIAL		INFORMAL		Total
	Satis- factory	Unsatis- factory	Satis- factory	Unsatis- factory	
Milk and Milk Products:					
Fresh milk from itinerant hawkers	446	186	..	..	632
Fresh milk from retail shops	105	4	109
Reconstituted milk	46	7	53
Tinned sterilised milk	6	..	6
Evaporated milk	7	2	9
Sweetened condensed milk	48	1	49
Dried milk powder	2	2
Separated milk	2	..	2
Cream	47	..	47
Ice cream	5	5
Infant food	1	..	1
Milk drinks	52	..	52
Ghee	5	7	2	..	14
Cheese	2	..	2
Other Foods:					
Tinned foodstuffs (Fruit, vegeta- bles, meat fish, etc.)	46	14	60
Wheat flour	3	..	3
Sago flour	6	..	6
Rice	8	..	8
Dhall	4	..	4
Sugar	13	2	15
Salt	6	..	6
Vinegar	9	1	10
Mustard	2	..	2
Magarine	5	3	8
Edible Oils	11	..	11
Tea	3	1	26	15	45
Baking powder	2	2	4
Flavour	1	..	1
Carried forward ..	454	194	460	58	1,166

NATURE OF SAMPLE	OFFICIAL		INFORMAL		Total
	Satis- factory	Unsatis- factory	Satis- factory	Unsatis- factory	
<i>Brought forward</i> ..	454	194	460	58	1,166
Beverages:					
Aerated water from fountains ..	..	..	132	50	182
Soda water from factories ..	4	1	12	5	22
Fruit drinks .. ..	..	..	35	12	47
Whisky	48	8	2	1	59
Brandy	31	4	..	2	37
Toddy .. ..	..	..	5	..	5
Sherry .. ..	..	..	2	..	2
Wine .. ..	..	..	1	..	1
Fruit essences .. ..	..	..	1	4	5
Drugs:					
Face powder .. ..	..	..	25	..	25
Camphorated oil	1	..	14	2	17
Tincture of Iodine .. ..	..	..	15	1	16
Ammoniated tincture of Quinine .. ..	..	..	6	5	11
Olive Oil .. ..	..	..	5	..	5
Medicines .. ..	..	..	5	..	5
Bleaching powder .. ..	..	..	..	2	2
Dextrose .. ..	..	..	1	..	1
Glycerine .. ..	..	..	1	..	1
	538	207	722	142	1,609

The milk samples were purchased from the itinerant vendors at much more regular periods than formerly and the method now used by the Sanitary Inspectors results in an almost daily stream of samples.

The proportion of unsatisfactory samples shows a reduction on last year's figures and this also applies to the average extent of adulteration. An average of one watered sample in every four, however, cannot be considered satisfactory. The results of the milk analyses are summarised in the following table:—

ANALYSES OF MILK SAMPLES BOUGHT FROM ITINERANT HAWKERS.

	Number of Samples	..	632
Deficient in non-fatty solids (i.e. with added water)	Number	..	174
	Percentage	..	27.5
	Range of deficiency	..	0.6% to 74.7%
	Average deficiency	..	9.61%
Deficient in Fat ..	Number	..	22
	Percentage	..	3.5
	Range of deficiency	..	1.5% to 32.3%
	Average deficiency	..	9.88%

Ten samples were deficient in both non-fatty solids and fat, making the total number of samples below standard 186, or 29.4%. Certificates for prosecution purposes were made out in 119 cases where the extent of deficiency was so great as to preclude any possibility of the milk being genuine but abnormal.

The samples of fresh and reconstituted milk obtained from the retail shops were on the whole very satisfactory, although in a few cases the quality fell slightly below the legal standards. Of the tinned milks, the chief troubles were that the statement of the "equivalent pints" of milk in the tin was a little optimistic. The ice cream samples contained less than the 10 per cent of butterfat required by the Regulations. Action was taken in the case of seven samples of Ghee, which contained large proportions of foreign fat.

A considerable number of tinned products were examined for injurious metals, and the attention of manufacturers was drawn to the results in many cases where the amounts present were more than negligible traces. It is hoped that by insisting on properly constructed containers having no internally soldered joints these products will be found free from metallic contamination. This applies also to several of the fruit drinks which were found to contain traces of lead.

Several samples of tea were found to be deficient in soluble substances while many of the tea dust samples contained excessive amounts of sand. Two of the baking powders were deficient in available carbon dioxide.

The aerated waters from the small fountains were fairly satisfactory, but it is essential to keep a close check on them for the presence of lead. It may happen for instance that repairs are carried out to a machine using an impure tin for soldering, with an immediate increase in the lead content of the carbonated water. The relatively large number of unsatisfactory samples is due to repeated sampling of unsatisfactory machines until good results were obtained. Most of the trouble with bottled soda water was due to deficiency in sodium bicarbonate which the Regulations state must be present to the extent of at least five grains per pint. Several samples of whisky and brandy were found to be "watered" and certificates for prosecution purposes were made out.

The drug samples gave quite good results, apart from two samples of camphorated oil, one of which was deficient in camphor and the other containing excess, and five samples of ammoniated tincture of quinine, which were deficient in ammonia. Samples were analysed for other departments as shown in the following table:—

SAMPLES	Water Dept.	Electrical Dept.	Engineering & Sewage Dept.	Gas Dept.	Total
Various waters ..	13	..	65	..	78
Various earths, sludges, de- posits, etc. ..	2	..	9	..	11
Sand	2	..	165	..	167
Coal	12	420	26	56	514
Fuel oil .. .. .	..	1	..	2	3
Coke .. .. .	..	..	..	251	251
Coal gas .. .. .	..	..	..	13	13
Coal tar .. .. .	..	..	..	6	6
Asphalt .. .. .	..	..	1	..	1
Various liquids	2	..	..	..	2
Porous tiles	2	..	..	..	2
Glazed pipes .. .. .	..	..	2	..	2
Lime	29	..	..	..	29
Sulphate of alumina ..	7	..	..	..	7
Chlorinated lime	1	..	..	..	1
Brass bolt	1	..	..	..	1
Metal disc .. .. .	..	1	..	..	1
Safety lamp .. .. .	..	1	..	..	1
Lubricating oil .. .. .	..	..	15	..	15
Salt .. .. .	..	..	1	..	1
Flux .. .. .	..	..	3	..	3
Oxide of iron .. .. .	..	..	..	21	21
	71	423	287	349	1,130

In addition, there were four samples of ink from the Stationery Department, one sample of water from the Vehicles Registration Department and two samples of liquid from the Fire Brigade.

Mr. J. F. Clark was in charge of the laboratory until my return from long leave in June.

I have pleasure in recording my thanks to the laboratory staff for their loyal and willing co-operation with Mr. Clark and myself.

I have the honour to be,

Sir,

Your obedient servant,

R. E. WILLGRESS,
A.R.C.S., B.Sc., F.I.C.,

Municipal Analyst,
Singapore.

TABLE A.

Averages and Ranges of Monthly Analyses of Singapore and Johore Raw Waters for 1938.

PARTS PER MILLION.	MacRitchie Reservoir		Peirce Reservoir		Sultan Ibrahim Reservoir		Pontian Ketchil Reservoir	
	Range.	Average.	Range.	Average.	Range.	Average.	Range.	Average.
Total solids dried at 180°C	20.0/44.4	29.5	18.4/47.2	28.4	32.4/44.4	37.2	36.4/63.6	45.1
Organic Matter ..	11.2/18.4	15.4	9.2/20.4	14.4	13.2/20.4	16.8	16.8/29.6	23.8
Mineral Matter ..	7.6/28.8	14.1	8.0/32.0	14.0	17.6/24.0	20.4	16.0/38.4	21.3
Total solids in suspension ..	1.2/11.6	5.3	1.6/13.2	4.5	1.6/8.8	5.0	0.8/10.8	4.2
Free and Saline Ammonia .	Absent/0.04	0.02	0.01/0.04	0.02	0.01/0.04	0.02	0.01/0.04	0.02
Albuminoid Ammonia ..	0.01/0.09	0.07	0.04/0.10	0.07	0.04/0.12	0.07	0.07/0.16	0.11
Nitrites as Nitrogen ..	.....	Absent	.....	Absent	.....	Absent	.....	Absent
Nitrates as Nitrogen ..	.....	Absent	.....	Absent	.....	Absent	.....	Absent
Oxygen absorbed in 3 mins.	0.14/0.27	0.19	0.22/0.34	0.27	0.18/0.26	0.22	0.26/0.44	0.37
Oxygen absorbed in 4 hours	0.47/0.93	0.63	0.71/1.04	0.88	0.62/0.84	0.73	0.75/1.43	1.21
Chlorides as Chlorine ..	1.0/4.0	2.0	1.0/2.0	1.5	1.0/2.0	2.0	1.0/2.0	1.5
Iron ..	0.55/1.30	0.90	0.25/1.05	0.55	0.20/0.70	0.49	0.50/0.95	0.67
Reaction—PH Value ..	5.8/6.5	6.2	5.7/6.5	6.1	6.4/6.9	6.7	6.3/7.0	6.7
Alkalinity (as CaCO ₃) ..	2.0/15.5	4.0	1.0/11.5	3.0	5.0/7.0	6.3	6.0/9.0	7.5
Carbon Dioxide ..	1.0/3.0	1.8	1.0/2.5	1.6	1.0/4.0	2.3	1.5/3.5	2.2
Colour in Lovibond 2 ft. Tintometer: Yellow ..	5.6/11.5	7.1	3.6/7.5	5.1	2.0/6.6	4.6	3.0/7.5	5.7
Red ..	1.2/2.6	1.8	1.0/2.4	1.4	0.4/2.4	1.5	0.6/2.7	1.7
Blue ..	0.1/0.6	0.3	0.1/0.6	0.3	0.1/0.6	0.3	0.1/0.6	0.3

TABLE B.
Averages and Ranges of Monthly Analyses
During 1938 of Woodleigh and Gunong Pulai
Clear Water Tanks.

PARTS PER MILLION.	PULAI CLEAR WATER TANK.		WOODLEIGH CLEAR WATER TANK.	
	Range.	Average	Range.	Average
Total Solids dried at 180°C	46.0/82.0	56.0	28.4/58.8	34.3
Organic Solids ..	9.6/21.6	14.4	8.4/16.8	12.4
Mineral Matter ..	34.8/60.4	41.6	16.0/46.8	21.9
Total Solids in Suspension	0.8/6.4	3.7	0.0/5.2	2.2
Free and Saline Ammonia	0.02/0.20	0.08	0.01/0.04	0.02
Albuminoid Ammonia ..	0.02/0.12	0.05	0.01/0.06	0.04
Nitrites as Nitrogen ..	....	Absent	....	Absent
Nitrates as Nitrogen ..	....	Absent	....	Absent
Oxygen absorbed in 3 mins.	0.07/0.17	0.12	0.03/0.15	0.08
Oxygen absorbed in 4 hours	0.13/0.39	0.24	0.19/0.42	0.32
Chlorides as Chlorine ..	2.0/3.5	2.5	1.0/3.0	2.0
Iron ..	0.05/0.18	0.08	0.10/0.25	0.17
Reaction—PH Value ..	6.8/9.1	8.1	6.7/9.2	8.5
Alkalinity (as CaCO_3) ..	11.0/24.0	15.7	3.0/20.0	15.1
Carbon Dioxide ..	Absent/3.5	1.1	Absent/1.0	0.1
Colour in Lovibond 2 ft. Tintometer: Yellow ..	0.6/1.2	0.8	0.8/1.5	1.1
Red ..	0.1/0.2	0.1	0.1/0.5	0.2
Blue ..	0.1/0.9	0.4	0.1/0.4	0.2

TABLE C.

Averages and Ranges of Monthly Analyses
During 1938 of Singapore Tap Supply.

PARTS PER MILLION.	HAVELOCK ROAD TAP SUPPLY		COLEMAN STREET TAP SUPPLY.	
	Range	Average	Range	Average
Total solids dried at 180°C	36.0/67.2	47.7	21.6/51.2	38.3
Organic solids ..	5.2/18.8	14.0	7.2/19.2	13.4
Mineral matter ..	24.4/52.0	33.7	7.6/33.6	24.9
Total solids in suspension ..	0.0/7.2	2.9	0.0/5.2	1.6
Free and saline ammonia ..	0.01/0.06	0.02	0.01/0.05	0.02
Albuminoid ammonia ..	0.01/0.08	0.04	0.01/0.05	0.03
Nitrites as Nitrogen ..	....	absent	....	absent
Nitrates as Nitrogen ..	....	absent	....	absent
Oxygen absorbed in 3 mins.	0.06/0.16	0.09	0.03/0.08	0.06
Oxygen absorbed in 4 hours	0.15/0.38	0.24	0.11/0.33	0.21
Chlorides as chlorine ..	1.0/4.0	2.0	1.0/4.0	2.5
Iron ..	0.10/0.25	0.14	0.07/0.20	0.14
Reaction—PH Value ..	7.2/8.6	7.8	7.0/7.7	7.3
Alkalinity (as CaCO ₃) ..	13.0/20.0	16.0	12.0/19.0	15.6
Carbon dioxide ..	absent/4.0	1.1	absent/3.0	1.6
Colour in Lovibond 2 ft. ..				
Tintometer: Yellow	0.8/1.6	1.1	0.7/1.7	1.4
Red	0.1/0.3	0.2	0.1/0.4	0.2
Blue	0.1/0.6	0.3	0.1/0.6	0.3

TABLE D.

Averages of Daily Analyses of Crude Sewage and Effluents from Alexandra Road Works during 1938.

PARTS PER 100,000		AMMONIA		Oxygen absorbed in 4 hours	Total Solids	Suspended Matter	Nitrates as Nitrogen	Chlorides as Chlorine	Dissolved Oxygen absorbed in 3 days	P.H. Value
		Free	Albuminoid							
1. Crude Sewage	..	4.7	0.9	7.50	94	29.3	..	21	..	6.9
2. Detritus Tank Inlet	..	..	..	..	..	40.2	..	..	..	..
3. Detritus Tank Effluent	..	6.0	1.1	10.20	109	42.0	..	21	..	7.0
4. Dorr Tank Effluent	..	6.3	0.8	5.63	90	15.9	..	23	..	7.1
5. Effluent 6 Upward Flow Tanks	..	6.2	0.8	5.35	90	15.2	..	26	..	7.1
6. Calculated Average Tank Effluent	..	6.3	0.8	5.50	91	15.6	..	26	..	7.1
7. Humus Tanks' Effluent	..	..	..	..	..	..	..	..	..	..
(1) From Blocks A, B & E	..	0.76	0.11	0.97	85	1.5	1.9	24	0.90	..
(2) From Blocks C & D	..	0.93	0.12	1.03	77	1.6	0.8	24	0.97	..
8. Bio-flocculation Unit Effluent	..	6.1	0.6	3.00	78	5.9	..	26	..	7.5

(D-81)

TABLE E.

Ranges of Daily Analyses of Crude Sewage and Effluents from Alexandra Road Works During 1938.

PARTS PER 100,000	AMMONIA		Oxygen absorbed in 4 hours	Total Solids	Suspended Matter	Nitrates as Nitrogen	Chlorides as Chlorine	Dissolved Oxygen Absorbed in 3 Days	P.H. Value
	Free	Albuminoid							
1. Crude Sewage	2.4/14.8	0.4/1.8	3.90/15.95	53.6/230.6	12.8/63.0	..	8/102	..	6.7/7.1
2. Detritus Tank Inlet .. ..	..	..	..	..	16.8/119.3	..	..	..	..
3. Detritus Tank Effluent	2.4/17.5	0.4/3.4	4.10/21.70	42.4/282.2	12.5/93.5	..	9/99	..	6.7/7.5
4. Dorr Tank Effluent	3.6/9.5	0.4/1.4	3.65/7.35	49.6/282.0	6.8/23.8	..	10/110	..	6.9/7.5
5. Effluent 6 Upward Flow Tanks	3.5/10.0	0.4/1.6	3.05/7.65	42.4/335.4	8.5/26.8	..	9/100	..	6.9/7.7
6. Humus Tanks' Effluent .. ..	..	..	..	..	..	..	..	..	..
(1) From Blocks A, B & E	0.12/2.40	0.04/0.28	0.63/1.92	39.8/214.4	0.5/3.9	0.7/4.8	10/90	0.26/1.94	..
(2) From Blocks C & D	0.10/2.80	0.04/0.36	0.54/1.64	34.6/206.6	0.5/3.4	0.1/3.2	10/82	0.35/2.26	..
7. Bio-flocculation Unit Effluent	3.6/9.0	0.3/1.1	1.65/4.52	37.0/274.2	2.0/9.7	..	11/73	..	7.3/7.9

(D-82)

BACTERIOLOGICAL LABORATORY,

Singapore, 1st March, 1939.

THE MUNICIPAL HEALTH OFFICER,
SINGAPORE.

Sir,

I have the honour to present the report of the Bacteriological Laboratory for 1938.

I. PUBLIC HEALTH SPECIMENS.

Malaria:—5,194 blood films were examined. Malaria parasites were found in 617 films or 11.9%. There were 325 subtertian infections, 287 benign tertian, and 5 mixed infections (subtertian & benign tertian). 199 positive films came from the Water Works in Johore, 162 came from the Health Department, i.e. from Municipal employees or patients at Middleton Hospital, and 256 were received from practitioners.

Tuberculosis. Human specimens:—1,700 specimens of sputum were received in 312 of which the tubercle bacillus was demonstrated. 6 specimens of faeces, 4 of urine, 4 of pus, 1 of pleural fluid and 38 of cerebro-spinal fluid were also examined, the tubercle bacilli were found in 1 faeces and in 1 urine.

Milk:—126 samples were examined microscopically and acid fast bacilli were found in 1 sample.

Animals:—6 specimens of organs from pigs killed at the abattoirs were examined and tubercle bacilli were found in 2 lymph glands. 4 specimens were examined from bullocks and all were positive, 1 being lung, 1 pleura, 1 lymph gland, and 1 kidney.

Typhoid & Paratyphoid Fevers:—1,211 sera were tested against the Eberth. typhi of which 591 gave a positive reaction. 437 tested against Sal. para-typhi (B. para A) gave 10 positives, and 437 tested against Sal. schottmuleri (B. para B) gave 18 positives. 38 samples of blood or blood clot were cultured and from 1 the Eberth. typhi was isolated in culture. 1,334 specimens of faeces and 1,163 of urine were examined and the Eberth. typhi was isolated from 15 faeces and 18 urines. 1 specimen of colon, 1 of bronchus, 1 of bile, 2 of spleen, and 1 of sputum were examined, all with negative results.

The year has been marked by a small epidemic of typhoid fever and this accounts for the abnormal number of agglutination tests and examinations of faeces and urine carried out. A good part of the work had been done in connection with an effort to discover the carrier or carriers amongst hawkers. During this period 28,350 c.c. of typhoid vaccine and 5,000 c.c. of bacteriophage were prepared. There are at present in stock at the abattoirs 10,950 c.c. of typhoid vaccine.

During the year 44 strains of Eberth. typhi were put through Xylose and Hydrogen Sulphate.

Dysentery

Amoebic:—1,637 specimens of faeces were examined in 45 of which the *E. histolytica* was found. *E. coli* was present in 19 and *E. nana* in 1.

Bacillary:—393 specimens were cultured and the *B. dysenteriae* of Shiga was isolated from 1, Flexner from 8, Hiss & Russell from 5, Strong from 1, Schmitz from 3, and Sonne from 5 specimens.

Cholera:—No specimens were received. 2,100 c.c. of cholera vaccine were prepared and stored at the abattoirs.

Plague.—

Human:—No specimens were received.

Rats:—4,005 rats were dissected but none were infected with plague. 1,391 came from the Port Area and Ships, and 2,614 were caught in the town. The species and distribution is shown in the following table:—

Source	R. Decumanus		R. Rattus		R. Concolor		Musculus		Crocidura	Total
	M	F	M	F	M	F	M	F		
Ports & Ships	81	133	352	550	38	49	—	—	188	1,391
Town ..	679	1,313	85	115	105	151	1	8	157	2,614
	760	1,446	437	665	143	200	1	8	345	4,005
	2,206		1,102		343		9			

17.4% of the females caught in the Port Area were pregnant and 12% in the town. Blood films from 2,712 rats were examined for *Trypanosoma lewisi* which was present in 438.

Fleas:—4,238 fleas were caught or 106 per hundred compared with an index of 181 for last year. The index for the Port Area was 125, a third more than last year, while in the town it was 96, less than half that of last year.

Cerebro-Spinal Fever:—100 specimens of Cerebro-spinal fluid were received in 40 of which the meningococcus was demonstrated. 1 specimen of pus from boil and 1 of blister fluid were also examined for meningococci with negative results.

Diphtheria:—2,744 specimens were examined and the *C. diphtheriae* isolated in 616. Virulence tests were done on 19 cultures of which 8 were virulent.

Leprosy:—60 smears were examined of which 14 were positive.

Miscellaneous specimens included:—

808	specimens of urine for general examination (1).
98	„ „ pathological exudate for general examination.
594	„ „ pus for gonococci (151 positive).
12	„ „ urine for gonococci (3 positive).
1	„ „ prostatic smear for gonococci (negative).
1	„ „ faeces for gonococci (positive).
5,452	„ „ faeces for intestinal parasites (2).
1	„ „ serum of <i>Trep. pallida</i> (negative).
7	„ „ pathological tissue.
1	„ „ pus for pneumococci (positive).
1	„ „ cerebro-spinal fluid for pneumococci (positive).
51	„ „ blood for differential count (3).
1,786	„ „ „ „ Wassermann Reaction (211 positive).
1,728	„ „ „ „ Kahn Reaction (193 positive).
248	„ „ „ „ Weil-Felix Reaction (1 positive “Kingsbury” strain).
2	„ „ „ „ culture.
1	„ „ „ „ blood urea estimation.
1	„ „ „ „ <i>Filaria</i> (negative).
2	„ „ „ „ Myelogenous Leukaemia (both positive).
1	„ „ „ „ Kala-Azar (negative).
3	„ „ „ „ agglutination with <i>B. abortus</i> (negative).
3	„ „ „ „ agglutination with <i>B. melitensis</i> (negative).
3	„ „ „ „ agglutination with <i>B. paramelitensis</i> (negative).
2,712	„ „ „ „ from rats for <i>T. lewisi</i> (438 positive).
20	„ „ „ „ cerebro-spinal fluid for Wassermann Reaction (4 positive).
19	„ „ „ „ „ „ Kahn Reaction (1 positive).
1	„ „ „ „ vaccine.
5	„ „ „ „ faeces for bacteriophage.
1	„ „ „ „ <i>B. abortus</i> (negative).
8	„ „ „ „ occult blood (2 positive).
2	„ „ „ „ swabs for <i>Cl. tetani</i> (both negative).
1	„ „ „ „ dusting powder for <i>Cl. tetani</i> (negative).
1	„ „ „ „ blood for complement fixation test for gonorrhoea (negative).
3	„ „ „ „ tinned ham (4).
52	„ „ „ „ ice cream.
236	„ „ „ „ milk.
12	„ „ „ „ disinfectant (5).

(1). Most of the urines were from M.O. in charge of Staff in connection with medical examination.

(2). 853 contained Ankylostome ova, 754 Ascaris ova, 1,028 Trichuris ova, 32 Oxyuris ova, 7 Strongyloids, and 20 Giardia cysts.

(3). Most of the differential blood counts were done for Middleton Hospital in cases of measles and rubella.

(4). These specimens came from the Market Inspector.

(5). 10 disinfectants were examined in connection with tenders for supply and 2 were check samples from the Town Cleansing Department.

Wassermann and Kahn Reactions:—1,786 specimens of blood and 20 of cerebro-spinal fluid were examined. Of these 1,806 specimens 215 were positive, 1,564 negative, and 27 doubtful as being anti-complementary.

The Kahn Reaction was done in 1,747 specimens and agreed with the Wassermann in 1,651 or 94%. Of the anti-complementary bloods 5 had a positive Kahn and 22 a negative Kahn.

The Wassermann and Kahn Reactions are summarised in the following table. The sign “++” = Wassermann positive, Kahn positive, “--” = Wassermann negative, Kahn negative, “+ —” = Wassermann positive, Kahn negative, “— +” = Wassermann negative, Kahn positive, “A.C.” = Wassermann anti-complementary.

Source.			Wassermann and Kahn					Wassermann only			Total	
			++	--	+-	-+	A.C.+	A.C.—	+	—		A.C.
L.M.O.												
Females	..	..	26	243	7	4	1	—	2	1	—	284
Males	..	..	5	37	—	1	—	—	—	—	—	43
Infants	..	..	17	109	2	—	—	—	1	24	—	153
Cord	..	..	—	2	—	—	—	—	—	—	—	2
A.N.	..	..	23	499	16	6	1	13	—	3	—	561
St. Andrew's Hospital												
A.N.	..	..	8	297	6	—	1	6	—	1	—	319
V.D.	..	..	16	36	—	2	—	1	3	8	—	66
Cord	..	..	—	—	—	—	—	—	—	—	—	—
General	..	..	14	124	3	4	1	1	1	13	—	161
Middleton Hospital	..	..	6	16	2	—	—	—	—	—	—	24
Health Office	..	..	39	43	5	5	—	—	—	1	—	93
Kwong Wai Siu Hospital	..	..	1	3	—	—	—	1	—	—	—	5
Cerebro-Spinal Fluid	..	..	1	15	3	—	—	—	—	1	—	20
Others	..	..	8	63	—	3	1	—	—	—	—	75
			164	1,487	44	25	5	22	7	52	—	1,806

The total number of public health specimens received was 32,412 and the number of examinations carried out was 38,766 again a record.

II. WATER.

10,004 samples of water from the Municipal Supply were analysed, the examination consisting of an estimation of the number of colonies per ml. developing on agar at 37°C in 24 hours, and an estimation of the smallest quantity of water producing acid and gas in lactose, litmus, bile salt, peptone water in 24 hours at 37°C.

The results of the year's examinations, tabulated below, show that a pure and safe water was supplied.

Source.	Average No. of Colonies on agar per ml. at 37°C in 24 hours.	Lactose fermenters present in Percentage of Samples.				
		—100	+100	+10	+1	+0.1
Sultan Ibrahim V. Tower ..	135	1.3	98.7	64.4	7.1	—
„ „ C. W. Tank	16	100.0	—	—	—	—
Seletar Dam ..	317	3.8	96.2	69.1	21.2	—
Pierce Res. V. Tower ..	139	4.2	95.8	61.5	18.7	—
MacRitchie Res. V. Tower	132	—	100.0	80.1	22.9	—
Bukit Timah Raw ..	162	22.5	77.5	48.7	15.7	—
Woodleigh Main ..	105	16.1	83.9	41.9	9.7	—
Pearl's Hill I Depth ..	62	61.7	38.3	2.1	—	—
„ „ II „ ..	66	67.9	32.1	2.9	—	—
Fort Canning Res. ..	50	95.0	5.0	—	—	—
Tap (Laboratory) ..	38	96.3	3.7	0.4	—	—
„ (Lorong Lalat) ..	51	94.1	5.9	—	—	—
„ (Havelock Rd.) ..	59	90.4	9.6	—	—	—
„ (Average of 3 taps) ..	49	93.6	6.4	0.1	—	—

Res. = Reservoir. V. Tower = Valve Tower. C. W. Tank = Clear Water Tank, i.e. after treatment.

This table shows how very free from contamination the raw waters are, since none of them during the year contained presumptive *B. coli* in less than 1 ml.

As in former years samples were taken on various occasions at different points along the pipe line, and it was shown that the water did not suffer any contamination during its journey from Gunong Pulai to Singapore. Samples from new mains were examined regularly before they were taken into use.

The water in Mount Emily Swimming Pool was regularly examined. The average results are given below.

Source.	Average No. of Colonies on agar per ml. at 37°C in 24 hours.	Lactose fermenters present in Percentage of Samples.			
		—100	+100	+10	+1
Shallow End 7.30 a.m. ..	36	82.5	17.5	2.6	—
Deep End 7.30 a.m. ..	24	96.2	3.8	0.4	—
Shallow End 2 p.m. ..	14	100.0	—	—	—
Deep End 2 p.m. ..	15	99.1	0.9	—	—

As in previous years the samples taken in the afternoon are better than those taken in the early morning.

482 miscellaneous samples were examined and 761 specimens were examined for algae.

III. SEWAGE.

45 samples of chlorinated effluent from the Middleton Hospital were examined. The average number of colonies was 4,054 per ml. Lactose fermenters (presumptive *B. coli*) were not present in 100 ml. in 24.5% of samples and present in 100 ml. in 75.5%. They were present in 10 ml. in 53.3%, in 1 ml. in 53.3%, in 0.1 ml. in 44.4%, in 0.01 in 22.2%, in 0.001 ml. in 11.1%, and in 0.0001 in 2.2%.

13 samples of wash water from the Conservancy Department were examined and were satisfactory.

IV. MORTUARY.

There were 18 postmortems during the year. The causes of death were:—

Diphtheria	..	..	..	3
Lobar Pneumonia	..	..	..	2
Gangrene of Lung	..	..	..	1
Pulmonary Tuberculosis		..	..	1
Capillary Bronchitis	..	...	..	1
Enteric Fever	..	..	..	4
Enteritis	..	..	..	3
Measles	..	..	..	1
Multiple boils	..	..	..	1
Acute Pemphigus	..	..	..	1

(D-89)

V. STAFF.

The Municipal Bacteriologist, Dr. C. C. B. Gilmour, proceeded on home leave in October, since when the writer has been in charge of the laboratory. .

I have to record my thanks to the laboratory staff for their loyalty, willingness and co-operation during the year. Their behaviour during the typhoid outbreak had been specially creditable.

I have the honour to be,

Sir,

Your obedient servant,

LEE EE KIAM, L.R.C.P. & S.E.,

Acting Municipal Bacteriologist.

(D-90)

MUNICIPAL HEALTH OFFICE,

Singapore, 20th February, 1939.

The Municipal Health Officer,

Singapore.

Sir,

I have the honour to submit the following report of the work done in the Supervision of Midwives and Infant Welfare Department during the year 1938.

NEW BABIES.

During the year, 20,031 new babies were taken on the Clinic Registers; this is 1,464 more than in 1937, and represents 88.209% of the total births for the year, compared with 82.07% in 1937.

INFANT WELFARE CLINICS.

In 1938 the Clinic Consultations amounted to 51,686 which were 1,063 more than in 1937.

The mothers are showing an increasing tendency to come to the Clinics for help and advice regarding the feeding and care of their infants, and there is abundant evidence that they are still going straight to Hospitals in greater numbers for the treatment of their sick infants, and there have also been more cases coming to the Clinics for "letters" for Hospital treatment than hitherto, i.e. 1,491 patients were given "letters" for Hospital treatment during 1938—709 as In-patients, and 782 as Out-patients, which is a total increase of 472 compared with 1937.

I have always endeavoured to get the parents to understand the scope of the Infant Welfare Clinics, and that true Hospital or Doctors' cases cannot be treated there, and I think that our efforts in that direction are bearing fruit.

As in previous years, any treatment done at the Clinics has been of the simplest, all other cases being sent to Doctors or Hospitals, with the exception of conjunctivitis and chronic otorrhoea.

In all my Annual Reports I have commented upon the attitude of the parents towards these ailments in their infants, and that they seem to attach no importance to these conditions, so that if we did not treat these cases in the Clinics, there is every possibility that nothing would be done for them.

Regarding the cases of conjunctivitis treated during 1938, it is worthy of note that of 307 specimens taken in cases of "sticky" or discharging eyes, 89 or 28.99% were found to be positive gonococcal infections, while 83 or 27.03% were negative to gonococcal but positive to Bacillus Xerosis infections, and only 1 case was negative to both gonococcal and Bacillus Xerosis infections, but positive to Koch Week's infection.

Of the actual number of 307 specimens examined from infected eyes, 28.99% gonococcal conjunctivitis (ophthalmia neonatorum) is admittedly high, but when one considers that this is the total number of specimens taken from a total of 15,202 infants seen by the District Staff Nurses within the first ten days of life, it will be realised that the actual incidence is remarkably low, and speaks well for the work done by the Registered Midwives in the town, when one knows the extent to which the population is infected with gonorrhoea.

It is gratifying to be able to report that the true work of the Clinics, i.e. teaching Mothercraft and Infant Hygiene is certainly showing encouraging results, and the majority of mothers take advantage of the advice and help extended to them.

There are of course, "difficult" cases, but when one remembers that customs and prejudices die hard, and one sees so many more mothers really trying to carry out our advice, one feels that it is safe to say that our work is making the desired impression on the mothers.

INFANTILE MORTALITY RATE.

The infantile mortality rate for 1938 was 177.4 per 1,000 live births, an increase of 5.5 per 1,000 live births compared with 1937.

Analysis of the figures for the chief causes of infantile deaths in 1938, compared with those for 1937, gives some rather striking results:—

	1938.	1937.
	Rates per 1,000	Rates per 1,000
Convulsions ..	35.693	37.885
Bronchitis and Pneumonia ..	39.887	34.746
Diseases of Early Infancy ..	30.157	31.696
Diarrhoea and Enteritis ..	24.914	27.914
Tetanus Neonatorum ..	6.962	8.488
Beri-beri ..	15.099	5.835
Congenital Syphilis ..	6.333	5.349

These totals leave a figure of only 19.075 per 1,000 live births for "other causes," compared with 19.918 per 1,000 live births in 1937.

Analysing the figures of the infantile mortality rate for 1938 for rate per 1,000 live births according to the nationalities, the following results are obtained:—

	1938.	1937.
	Rates per 1,000	Rates per 1,000
Chinese	178.9	172.4
Malays	235.6	229.9
Indians	128.9	139.5

When considering these last analyses, it should be borne in mind that the number of Chinese infants born far exceeds those of any other nationality, and that the increase of 5.5 per 1,000 live births in the infantile mortality rate for 1938 compared with 1937, can be practically entirely explained by the increase in the Chinese infantile mortality rate.

INFANT FEEDING.

Our efforts in the teaching of correct feeding of infants continue, and the results are gratifying.

Still more mothers are breast-feeding their infants, and I find that they are becoming more persevering when any difficulties arise.

Hitherto, the mothers would discontinue breast-feeding on the slightest pretext, but now, they take our advice far more readily in the matter of correct diet for a nursing mother, the technique of breast-feeding, etc., also, some mothers who, either because they go out to daily work or because they have a poor supply of breast milk, have previously abandoned breast-feeding altogether, do try to feed their infants naturally when ever possible, i.e. before going to work and on returning, in the case of the working mothers.

The method of true complementary feeding, however, is one which these mothers do not easily follow, and we must continue trying to teach them, and so prevent yet more bottle-fed babies.

Wherever necessary, free tonics, galactogogues, etc. are given to poor nursing mothers, and they are always told that they should make every effort for their own, as well as their infants' sakes, to continue breast-feeding.

MALAY ATTENDANCES AT THE INFANT WELFARE CLINICS.

Malay mothers are attending the Infant Welfare Clinics in increasing numbers; this is particularly the case at Joo Chiat Clinic, which is situated in an area where so many Malays live.

These mothers are gradually realising the benefits of attending for help and advice in diet and infant management, and it is to be noted that yet a few more Malay parents have allowed their babies to go to Hospitals when sick; in several cases the mothers expressed gratitude for our advice and help in giving them "letters" for their babies to have Hospital treatment and I feel that any remarks they make to their friends on the subject are far more valuable propaganda than any that we could circulate.

HEALTH VISITORS.

The number of house-to-house visits paid by the Health Visitors in 1938 was 126,475—an increase of 11,775 compared with the year 1937.

As explained in my Report for 1937, owing to the migration of families, and the increase in the number of babies on the Clinic Registers, it was decided to re-organise the work, and consequently the existing

districts into which the Municipal Area was divided for that purpose were re-arranged, and an additional district—the 12th—was created and another Health Visitor appointed.

In spite of this re-organisation and the appointment of another Health Visitor, the number of visits was 2,759 more than in the “record year” 1935, when I drew attention to the large number of daily visits each Health Visitor had to pay, and it is clear that we shall have to re-arrange the work again, to deal with the expected further increase in the numbers of babies on the Clinic Registers in 1939.

SUPERVISION OF MIDWIVES.

As in the work of the Health Visitors, so too, the work of the District Staff Nurses supervising the work of the Registered Midwives has had to be re-organised.

It was felt that the visits paid to mothers who had been confined in Hospital were frankly, superfluous, as it is obvious that only fit mothers would be discharged from Hospital within the ten days immediately following confinement—which is the period covered by the work of the District Staff Nurses—and it was decided to dispense with these visits, and to devote more time to visiting sick mothers in their own homes.

The figures for the year 1938 show that this step was more than justified, for 13,716 re-visits to 3,383 sick mothers were paid, an increase of 8,873 re-visits compared with the figures for 1937.

The total number of visits paid by the District Staff Nurses in 1938 was 32,367—an increase of 4,365 compared with 1937.

The District Staff Nurses paid 16,969 first visits to newly confined mothers; this shows an “apparent” decrease of 1,378 compared with 1937, but it must be remembered that mothers confined in Hospital were excluded from these visits.

In addition, 1,682 visits were paid seeking 843 wrong addresses; these visits show a decrease of 2,127 from those paid in 1937, and I consider that this is due to the exclusion of the Hospital-confined mothers.

Cases of newly confined mothers reported to the Clinics but untraced, amounted to 354 during 1938, i.e. 489 less than in 1937, and this is mainly due again to the Hospital-confined mothers not being visited.

Maternal deaths for the total number of confined mothers during 1938 amounted to 132, the causes being as follows:—

Abortion	..	..	..	..	3
Ectopic Gestation	..	..	..	..	4
Other Accidents of Pregnancy			..	..	4
Puerperal Haemorrhage	..	..	..	..	50
Puerperal Sepsis	..	..	..	..	29
Puerperal Convulsions	..	..	..	..	18
Toxaemias of Pregnancy	..	..	..	..	5
Pulmonary Embolism	..	..	..	..	2

Other Accidents of Childbirth	..	..	9
Puerperal Insanity	..	..	1
Childbirth "unqualified"	..	..	7

The number of mothers confined in Hospital and reported to the Clinics during 1938 was 6,907, while 12,095 were attended in their own homes by Registered Midwives, and 323 cases were attended by Private Doctors.

In addition, 4,905 mothers had no skilled attention at their confinements.

Of the 16,870 mothers seen by the District Staff Nurses during 1938, 13,589 were found to be living in cubicles or single rooms, i.e. 80.55% compared with 80.247% in 1937.

In every Annual Report submitted by me, I have laid particular emphasis upon my concern over the cases of mothers having no skilled attention at confinement.

The town is divided into 5 districts for the work of the Supervision of Midwives branch of the Infant Welfare Department, 2 districts comprising the congested areas, and 3 the "outlying" areas.

In 1938, 3,444 or 70.241% of the total of 4,905 mothers having no skilled attention at confinement were in these 3 districts.

In connexion with this very unsatisfactory state of affairs I can only repeat and amplify the remarks I have made in previous Annual Reports.

There are, in my opinion, two great stumbling blocks to women in these districts obtaining skilled attention.

Firstly, difficulty of transport, particularly at night, and secondly, extreme poverty.

Most of the people living in these places are "squatters" and even poorer than those living in the congested parts of the town, so that, for one thing, cost of transport even if obtainable, becomes a serious problem, and the mothers, however much they wish to do so, cannot get into Hospital for their confinement, neither can they afford to even send for one of the Municipal Midwives living at each Clinic, who attend all poor cases who ask for them, and obviously if they cannot afford transport they cannot afford to pay a midwife in private practice, although she might live within walking distance of the mother requiring her aid.

I think that it is a very significant fact that many of the cases of immediate complications of parturition such as adherent placenta, haemorrhage and torn perineum occur among these women, and it should be noted further, that once again I have to report that all cases of infants developing Tetanus Neonatorum have occurred among these cases of no skilled attention at birth.

As there is practically no decrease in the figures for these cases, comparing those for 1938 and 1927 (or for that matter for previous years), it appears that the solution to the problem lies in the adoption

of some scheme whereby Municipal Midwives be appointed to live in these "outlying" districts—particularly Districts B and E—and further, it is possible that the places where these Municipal Midwives would reside might, at a future date, become the nuclei of small sub-clinics for Ante-natal and Infant Welfare work, as there is every indication that the three present Clinics may become too centralised, with the spreading of the town and the increasing population.

In 1938 there were 24,378 births reported to the Clinics; these included 146 pairs of twins and 1 triplets, and the total figure shows an increase of 3,423 compared with 1937.

Of the 24,230 mothers whose confinements had been reported to the Clinics during 1938, the District Staff Nurses saw 16,870, while 29 had died and 70 had removed within the first ten days after confinement.

It is probable that the difference in mothers reported to the Clinics and actually seen by the District Staff Nurses can be explained in a great measure by the number of mothers confined in Hospital during the year and consequently not visited.

Of the 24,378 births reported to the three Clinics in 1938, 16,398 infants were seen by the District Staff Nurses within ten days of birth, while there were 275 stillbirths and 186 infants had died in that period after birth: 952 were found to be ailing, and 569 had removed or were "nursed out" or were sick in Hospital.

Of the 16,398 infants seen, 12,485 or 76.198% were breast-fed, 3,093 or 18.848% were bottle fed, and 820 or 5.000% were on supplementary feeds.

MUNICIPAL MIDWIVES.

The total number of poor cases attended by the Municipal Midwives in 1938 was 2,142—an increase of 488 compared with 1937.

These cases comprised 649 confinements, 3 miscarriages, and 1,473 post-natal cases; in addition they attended 17 cases who had to be transferred to Hospital and in all paid a total of 8,612 visits.

PUERPERAL SEPSIS.

In 1938 there were 31 cases of puerperal sepsis reported to the Clinics, of whom 29 died.

This is an increase of 12 cases compared with the year 1937, and it should be noted that many of these cases occurred who had no skilled attention at confinement, and were eventually seen and reported by Private Doctors or Hospitals.

"PANEL" DOCTORS.

During 1938 there were 78 cases of complicated labour in poor mothers, to whom the Private Practitioners on the special Municipal "Panel" for dealing with these cases, were called by Registered Midwives.

This is an increase of 22 cases compared with those in 1937 and I think that this increase in numbers is more an indication that the Registered Midwives are quicker in detecting complications and in calling in the "Panel" Doctors, rather than that there was a real increase in difficult labours.

TETANUS NEONATORUM.

In 1938 there were 79 cases of tetanus of the newly-born, as compared with 68 in 1937.

All these cases were reported to me, and, as in previous years were investigated, and all were found to have occurred in cases of unskilled attention at confinement.

VENEREAL DISEASES.

Once again I have to report that there is no appreciable change in the incidence of maternal and congenital Syphilis as seen among the mothers and babies on the Clinic Registers.

It is hoped that the anti-syphilitic work undertaken in the new Ante-natal Clinics (to which I will refer later in this Report) will ultimately have some effect upon the disease in this particular form, but here again, it is uphill work, and one cannot hope for a rapid decline in the number of cases.

My observations regarding the incidence of gonorrhoea as seen by us in the Infant Welfare Department, have been included in my report above, on gonorrhoeal conjunctivitis (ophthalmia neonatorum).

DIET DEFICIENCIES.

The problem of malnutrition among the mothers and babies due to insufficiency or total lack of essential vitamins and mineral salts in their diet, is perhaps the most serious of all with which the Infant Welfare Department is faced.

It is a subject which I have mentioned in detail in previous Annual Reports (vide Annual Report for 1937), and I have stated that I view the whole matter with "concern and alarm."

I cannot stress too strongly the gravity of the situation.

The incidence of beri-beri in particular, is nothing short of appalling, both in the mothers and in the infants, and if figures can assist in emphasising my anxiety over the situation in regard to this disease only, then those for the infantile mortality rate from beri-beri in 1938 taken alone, or in comparison with those for 1937, speak for themselves.

Reference should be made, while considering these figures, to the decreases recorded in infantile deaths from the other "Chief Causes of Infantile Deaths" reported earlier under the heading of "Infantile Mortality Rate," notably "Convulsions," "Diseases of Early Infancy" and

Diarrhoea and Enteritis;" and at the same time, reference should also be made to the reported increase in the number of infantile deaths reported under the heading of "Bronchitis and Pneumonia."

I would also draw attention to my remarks made regarding the deaths reported from these diseases in 1937, viz; "I still adhere to the opinion that I expressed in my Report for 1936, that there are many infantile beri-beri deaths recorded under the headings "Convulsions," "Diseases of Early Infancy," and "Broncho-pneumonia," where the symptoms of these diseases may often mask those of the underlying and causative beri-beri."

I consider that the figures for 1938 strongly suggest that beri-beri as such, is being reported as the actual cause of infantile deaths rather than the three causes which show a decline, but that there are still a good many being reported under the heading of "Broncho-pneumonia," which is such a prevalent disease among cases of beri-beri, and may easily be mistaken as the primary cause, especially in moribund babies.

I can quite safely say that the deaths from infantile beri-beri would have been greater, if it were not for the prompt injection of large doses of vitamin B together with other energetic measures for the resuscitation of a large number of infants taken to the Hospitals and Infant Welfare Clinics in a dying condition.

I have quite naturally, laid stress on the actual deaths from beri-beri among infants, but even that gives no true idea of the tremendous numbers of mothers and babies suffering from the disease.

Every day in the Clinics, we have cases of beri-beri; some babies with signs so slight that they are scarcely evident and the parents have probably brought the infants to the Clinics for "other" illnesses, such as gastric disturbances, chest complaints etc: but nevertheless, the disease is there, and if not treated adequately and promptly will soon result in permanent physical disability or sudden death.

Other infants may be brought to the Clinics showing obvious signs of the disease, which may develop into the acute cardiac type (so often rapidly fatal) within the space of a few hours if untreated—I recall one case, where a mother was bringing her baby to the Joo Chiat Clinic, suffering from a "cough," and on the way to the Clinic it developed acute cardiac dilatation and arrived moribund, and it was only with injection of vitamin B etc: that it revived.

Still other infants may be seen for the first time, in convulsions or moribund from broncho-pneumonia etc:

The entire Infant Welfare Staff is doing the utmost to try and improve the state of affairs, unceasingly advising mothers as to the correct diet for themselves when pregnant or nursing their infants, and for their babies when weaned, but it is exceedingly difficult to do any good in this direction, but one finds that there is, happily, a slowly increasing number of women who will try "towhoo" and other articles of diet rich in vitamin B, and who will continue to take them when they found that they do not have any of the expected ill-effects, but getting the mothers to take unpolished rice is a totally different matter.

Quite a few women have tried to eat the unpolished rice, but not may persevere and keep to it as the main article of their diet. Some say quite frankly that they "cannot eat it," while others have to discontinue buying it because of the difficulty in obtaining it in the town and because it is more expensive than the white, polished variety.

We found that some women living in the outlying districts will eat the type of unpolished rice known as "bras ayam," which is mixed with red beans etc: but town dwellers in Singapore seem to be the same as those anywhere else, in that they will not make use of an article of food tolerated by the rural dwellers.

Beri-beri is a positive scourge, whether looked at from the purely medical point of view or solely from the aspect of economics.

My anxiety over this disease is such that I have devoted a tremendous amount of time and thought to the possible solution of the problem, and I cannot see that the Infant Welfare Department can tackle this question in any other way than it is doing, namely, to continue to teach the mothers the correct "anti-beri beri diet," providing them with the necessary vitamin B in some form until they take it in their food as a matter of course.

The only other way to approach the matter, is one which I submit for earnest and serious consideration i.e. that the Department should be given facilities for supplying the mothers at all three Clinics with vitamin B in the form of unpolished rice at cost price, and that these mothers should be allowed to continue purchasing this from the Clinics for the use of themselves and families after their infants have ceased to be on the Clinic Registers at the age of 1 year.

I have gone into this question thoroughly and think that it could be done, and that it would be cheaper and preferable to sell unpolished rice to the mothers than to supply the vitamin B in rice polishings extracts, soya bean milk etc.

I have mentioned beri-beri or vitamin B deficiency at great length, because it is the most prevalent deficiency disease met with in our work, but there are plenty of signs of the lack of other vitamins and also of mineral salts in the mothers and babies.

Anaemias of infancy are also common and are mainly due again to a deficient diet in the mothers during pregnancy and lactation and also in the diets given to the infants at and after weaning, and we continue to advise the mothers as to the correct diet to combat this disease in themselves and their infants, providing free preparations rich in iron etc. whenever necessary.

ANTE-NATAL CLINICS.

In January 1938 Ante-natal work was put on a properly organised footing, and Ante-natal Clinics were started at the three centres, instead of pregnant women being seen and treated in the ordinary Infant Welfare Clinics.

During the year 801 new cases were taken on the books, there were 2,760 consultations with these mothers, while 1,799 visits were paid to them in their homes.

Of these 801 mothers, 100 were sent to Hospital for treatment, 46 as In-patients and 54 as Out-patients.

The main object of this work is the treatment of maternal Syphilis and beri-beri, and during the year 95 pregnant mothers were given 716 antisyphilitic injections and treatment.

Of these 95 mothers up to date, 75 have been confined, and of the 76 babies born (there was 1 case of twins) so far 61 were born healthy (1 has had a negative Wassermann result), 6 are reported to be unhealthy, and there have been 3 stillbirths, 3 abortions, 1 premature (dead) delivery, and 1 miscarriage; in addition, 6 have died, 3 of gastro-enteritis, 1 of prematurity, and 1 of congenital syphilis.

In addition to the mothers treated, 18 more were found to be infected with syphilis, but 10 of these were delivered before they had any treatment, and 8 removed and have not been traced and 4 mothers are still undelivered and receiving anti-syphilitic treatment.

The difficulty in this work is that the mothers so often come to the Clinics very near the end of their pregnancies, but during the year it was found that as time went on, many more mothers presented themselves at the Clinics earlier in pregnancy, so that it was possible to ensure that they had longer courses of anti-syphilitic treatment, and it was found that in a good many of these cases, the mothers were those who had already been advised to report to the Clinics as soon as they knew that they were pregnant again.

All mothers attending these Ante-natal Clinics are taught the correct diet to combat beri-beri, and also are advised the proper articles of food to take to prevent anaemias of pregnancy, nephritis etc.

Whenever necessary, in cases of frank beri-beri during pregnancy, injections of vitamin B and special preparations rich in that vitamin have been provided free.

It has been found that a high percentage of pregnant women presenting themselves to these Clinics suffer from anaemia, and investigations undertaken to ascertain the cause, when improved diet and iron tonics did not cure the condition.

Specimens were examined in 59 cases to discover whether the mothers were suffering from any type of worm infection, and it was found that 38 or 64.41% of these 59 specimens were positive ankylostome (hookworm) infections, together with ascariasis (roundworm) infection in nearly all positive cases.

It has been difficult to get these mothers to submit to Hospital treatment, and admittedly, such treatment is not easy in a pregnant woman, so that we are faced with yet another problem in dealing with these women.

It is realised that a routine examination of all pregnant women attending the Ante-natal Clinics should be made for the presence of hook-worm and roundworm infection, but that would mean a great strain on the Municipal Pathological Department, if specimens were sent in so many cases, and so it is felt that at any rate at present, only cases where the cause of anaemia is found as not due to deficient diet, can be investigated.

The numbers reported above are small, but this reason explains that to a great extent; but the percentage of positive cases is notable, and calls for still more energetic measures on our part in advising the mothers regarding the hygienic preparation and consumption of their food, and general hygiene in their homes, and I would like to point out in this connexion, that 78.31% of the cases found to be infested with ankylostome or ascaris worms occurred in the outlying areas surrounding Joo Chiat Clinic.

ANTI-DIPHTHERIA IMMUNISATION.

During the early part of 1938 special work was undertaken at the suggestion and with the co-operation of the Municipal Bacteriologist, investigating the possibilities of immunising babies of 1 year of age against diphtheria, in the Municipal Area.

The children immunised were all as near as possible to 1 year of age, but in a few instances, where the mothers came to the Clinics with older children these were also immunised with their parents' consent.

The results of this experiment in immunising are instructive:—

Age at Schick Test.		Immunised.		Controls.	
		+	—	+	—
1 year	..	—	3	66	10
14 months	..	—	—	1	—
16	„	—	12	1	—
18	„	1	25	—	1
19	„	1	17	—	—
20	„	1	7	1	—
21	„	1	2	—	—
22	„	1	—	—	—
2 years	..	1	3	2	—
2½	„	—	2	—	—
3	„	—	1	1	—
4	„	—	1	1	—
		6	73	73	11

With regard to the above table, it should be remembered that in the case of "immunised" infants the prophylactic injections had been given 6 months previously.

Considering the results of the Schick Tests done, in relation to the three Clinics, the following results are obtained:—

Clinic.	Immunised.		Controls.		Out when visited for Schick Testing.
	+	—	+	—	
Prinsep Street ..	2	32	26	4	3.
Kreta Ayer ..	5	35	47	7	3.
Joo Chiat ..	—	11	—	—	—
Total	7	78	73	11	6.
Percentage	8.5	91.5	87	13	—

+ Schick positive i.e. susceptible.

— Schick negative i.e. immune.

In view of the prevalence of the disease in the town and also of the high number of babies shown to be open to attack, and also of the high percentage rendered immune by injections, it was decided to immunise all babies of 1 year old, with the parents' consent and it is hoped that by this means the prevalence of the disease, and of the numbers of carriers, together with the possibility of a widespread epidemic in the near future, might be materially diminished.

CHARITABLE ORGANISATIONS.

I would like to take the opportunity once again, of recording my deep appreciation of all the practical help extended to the large number of necessitous cases we have referred to the Salvation Army and the Silver Jubilee Fund during 1938, and also to the Child Welfare Society for their co-operation with the Infant Welfare Department in their care of a greatly increasing number of "Municipal Babies" in their two Creches.

CHANGES OF STAFF.

Health Visitor Grace Kwai Ling Kok was promoted to Staff Nurse.

Miss Wong Syu Kim was appointed Health Visitor when an extra appointment was authorised for the special Ante-natal Clinics.

Miss Elsie Tan was appointed Health Visitor.

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Miss Lim Ah Chee and Miss Lee Soo Moi were appointed as Health Visitors, their appointment to take effect as from the beginning of 1939, to fill the posts approved as a temporary measure in connexion with the Anti-diphtheria Immunisation work.

I have the Honour to be,

Sir,

Your obedient servant,

MURIEL G. E. CLARK,

Lady Medical Officer.

Middleton Hospital,

Singapore, 20th January, 1939.

The Municipal Health Officer,
Singapore.

Sir,

I have the honour to present the report of the Middleton Hospital for the year 1938.

The following table summarises the cases treated during the year.

Disease	Remaining	Admitted	Discharged	Died	Remain- ing
Smallpox	—	2	2	—	—
Cholera	—	—	—	—	—
Plague	—	—	—	—	—
Chickenpox	29	695	697	1	26
Measles	3	112	106	9	—
Diphtheria	11	192	149	42	12
Cerebro-Spinal Fever ..	1	20	5	15	1
Erysipelas	—	4	4	—	—
Whooping Cough ..	—	1	1	—	—
Mumps	7	187	189	—	5
Under Observation & Contacts	1	69	67	—	3
Rubella	1	49	50	—	—
Typhoid	—	238	238	—	—
Typhoid Contacts ..	—	296	296	—	—
Scarlet Fever ..	—	1	1	—	—
Other Diseases ..	—	50	38	12	—
Total ..	53	1,916	1,843	79	47

The number of patients treated was 609 more than last year. The increase is accounted for principally by the number of Typhoid Convalescents transferred from the General Hospital and the number of Food Hawkers admitted and examined as potential carriers during the last epidemic of Typhoid in the Telok Ayer District. There was also an increase of 25 in Diphtheria, 51 in Measles and 35 in Rubella.

Two cases of Smallpox were treated and both recovered. No cases of Cholera or Plague were admitted.

Diphtheria. This disease still accounts for the largest mortality in this hospital. The number of cases treated was 203, of whom 192 were admitted during this year—an increase of 23. 42 patients died, a mortality of 20.7%. Eighteen of these died within 24 hours and 5 within 36 hours of admission and if these are deducted the mortality is 9.4%. Thirteen died within 7 days and six between the first and the third week. Sixty-eight cases or 33½% were laryngeal or tracheal in type, of these 52 required tracheotomy, and of those operated on 20 died. The different nationalities treated were 6 Europeans, 7 Eurasians, 6 Indians, 172 Chinese, 2 Malays, 2 Jews and 8 Japanese. Forty-one of the deaths were among Chinese and one Dutch. Classified according to age, 18 Patients were under one year of whom 8 died, 99 were between one year and 5 years of age of whom 31 died, 47 were between 5 and 10 years of whom 3 died, 20 between 10 & 15 years, 7 between 15 & 20 years and 12 above 20 years of age. The highest mortality rate will, therefore, be seen between the ages of one year and 5 years. The provision in the Budget this year for the immunisation of all children under one year of age before they are transferred from the register of the Infant Welfare branch, should substantially help to reduce this mortality. The average dose of serum given per case was 24,000 units.

Cerebro-Spinal Meningitis. Five out of 21 cases recovered and one remained at the end of the year.

Chickenpox. Excluding the Typhoid Convalescents and suspected Typhoid Carriers admitted during the year, this disease, as usual, continues to account for about half the yearly admissions. 139 Municipal Employees, 38 Government servants, 22 Singapore Harbour Board Employees, 115 school children, 10 Police Officers, 33 patients from the various military departments and 338 from the general public were treated for this disease. One patient, a baby 8 months old, died due to sepsis and extensive cellulitis of the back.

Other Diseases. Fifty cases admitted as suffering from one or other of the notifiable infectious diseases were found not to be so, and of these twelve died. The causes of death being 2 Pneumococcal Meningitis, 1 Tubercular Meningitis, 5 Bronchitis, Pneumonia or Broncho-Pneumonia, 1 Encephalitis, 1 Thrush, 1 Multiple Boils and 1 Acute Intestinal Obstruction.

Nationalities. The nationalities and the number of days spent in hospital are summarised in the following table:—

Nationality.	Remaining from 1937		Admitted 1938	
	No. of Patients.	No. of Days.	No. of Patients.	No. of Days.
European	1	7	37	486
Eurasian	1	20	76	1,069
Indians	37	301	812	8,972
Chinese	14	207	875	11,654
Malays	—	—	102	1,100
Jews	—	—	5	92
Japanese	—	—	9	295
Total ..	53	535	1,916	23,668

The following table shows the distributions of patients by employment.

Singapore Municipality	..	..	..	202
Government Employees	..	..	..	59
Singapore Harbour Board	..	..	..	26
School Children	..	..	..	172
R.A.F.	..	..	..	101
H.M. Naval Base	..	..	..	46
Army Department	..	..	..	23
Police Force	..	..	..	51
General Public	..	..	..	1,236
Total				1,916

The number of children admitted was 521 as compared with 393 last year.

The following table shows the admissions for the last ten years.

Disease	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Cholera	—	—	—	—	—	—	—	—	—	—
Smallpox	9	—	3	7	1	1	61	1	—	2
Plague	—	—	—	—	1	—	—	—	—	—
Chickenpox	553	334	196	491	252	398	538	835	709	695
Diphtheria	38	35	46	90	159	152	115	146	170	192
Cerebro-Spinal Fever	3	17	6	6	3	7	11	19	15	20
Measles	42	60	58	7	110	58	144	181	64	112
Erysipelas	1	7	1	—	2	2	4	3	1	4
Mumps	66	10	17	22	178	149	61	388	206	187
Whooping Cough	1	14	20	3	8	6	3	2	1	1
Enteric Fever	—	1	1	1	—	—	—	1	—	238
Tuberculosis	1	1	1	1	3	4	—	3	—	—
Rubella	6	5	14	4	1	40	29	24	14	49
Scarlet Fever	6	—	—	—	—	2	1	—	—	1
Typhus Fever	—	—	—	—	—	1	—	—	—	—
Puerperal Fever	—	1	2	—	—	—	—	—	—	—
Contacts	17	48	22	36	357	37	90	36	82	365
Other Diseases	63	44	44	55	85	73	94	81	62	50
	806	577	431	724	1,160	930	1,151	1,670	1,324	1,916

Staff. Miss McMurray, the matron, retired from service on 1st June 1938, and Mrs. R. A. Auten was appointed to her place. Dr. Gilmour, went on leave on 26th October 1938, since when the writer has been in charge.

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I wish to thank Prof. Hawes and Prof. Johns for their help and for undertaking such surgical treatment as could not be given in this hospital.

General. To meet the increase in admissions due to the Typhoid epidemic mentioned earlier in this report, the staff had to be temporarily supplemented by the appointment of Dr. J. T. Fernandez, 3 dressers, 7 ayahs and 5 ward attendants.

I have the honour to be,

Sir,

Your obedient servant,

A. THURAI, L.M.S.,

Ag. Medical Superintendent.

(D-107)

MUNICIPAL HEALTH OFFICE,

Singapore, 8th February, 1939.

THE MUNICIPAL HEALTH OFFICER,

SINGAPORE.

Sir,

I have the honour and duty to submit my nineteenth Annual Report on the Markets of Singapore, their repair and upkeep and the inspection of foodstuffs sold in them and in the town generally.

MUNICIPAL MARKETS.

Joo Chiat Market was closed down at the end of April and converted into coolie lines, leaving nine Municipal Markets which may be said to flourish. Three new private markets have been built since in the Joo Chiat Area and appear so far to be well patronized. The Annual Cleansing took place as usual on Chinese New Year's day and I have to thank the Superintendent Fire Brigade for the loan of hoses etc. to clean the loftier markets. Twenty-eight small rats were caught and killed during this operation.

REPAIRS.

Clyde Terrace Market. The market office was colourwashed and painted, the iron gates were repaired and at the latter end of the year the whole market was regraded and drained. This necessitated the demolition of all the fish slabs and new pre-cast concrete ones were installed. A re-arrangement of the fish slabs allows for 3 buying avenues now and should lessen congestion.

Ellenborough Market. The office roof was repaired and the office colourwashed. A tender for re-roofing the main market was accepted but work has not yet commenced.

Telok Ayer Market. 26 new sunshades were fixed in September.

Grange Road Market. Six new chicks were put up. The stalls from Joo Chiat Terrace were fixed in this market and the old wooden ones were erected in Peoples Park.

Peoples Park Market. Double grids were fixed to all drain outlets. The roofs of the sheds were repaired and a concrete roadway laid around 2 of the sheds in place of the old asphalt pathways.

General. New number plates were supplied to all market stalls and repairs to lighting and water services were executed on request.

UN SOUND FOODSTUFFS.

104,815 catties or roughly 62 tons of unsound foodstuffs were sent to the incinerators for destruction.

PRICES & QUANTITIES OF FOODSTUFFS.

Wet fish sales dropped 3 million catties or 14% of last year's sale, due to severe boycotting of Japanese caught fish. Beef, mutton and pork, however, show an increase in sales but the total value fell \$500,000. This is almost entirely due to the fall in fish prices. Japanese-caught fish which usually sells at \$5—\$7 per box of 45 catties fetched only \$1—\$2 per box.

Table A below will show that prices of other staple commodities were if anything slightly below 1937 figures.

TABLE (A).

Article.	Per	1933 Av. Price	1934 Av. Price	1935 Av. Price	1936 Av. Price	1937 Av. Price	1938 Av. Price
		\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Beef ..	Kati	.30	.29	.36	.33	.33	.31
Mutton ..	lb.	.33	.31	.31	.35	.41	.35
Pork ...	Kati	.42	.41	.43	.42	.44	.44
Tea ..	"	.83	.85	.80 pkts. 1 lb.	.78	.84 pkt. (1 lb.)	.85 pkt. (1 lb.)
Coffee beans ..	"	.40	.40	.40	.39	.35	.31
Sugar ..	"	.05	.05	.04	.04	.05	.05
Salt ..	"	.03	.02	.02	.02	.02	.02
Potatoes ..	"	.06	.05	.06	.05	.05	.06
Yam ..	"	.03	.03	.03	.03	.03	.03
Onions ..	"	.05	.05	.05	.06	.06	.06
Ducks ..	Dozen	6.00	5.40	5.07	5.04	5.47	5.08
Pigeons ..	Pair	.78	.70	.70	.65	.60	.50
Eggs (hens) ..	Dozen	.31	.30	.25	.25	.31	.31
Capons ..	Kati	—	—	.53	.50	.52	.51
Fowls ..	Each	.60	.50	.48	.45	.49 1½ catties	.46 1½ catties
Rice ...	Gantang	.25	.23	.30	.28	.30	.28

REVENUE (TABLE B).

Market	1933	1934	1935	1936	1937	1938
Clyde Terrace	\$107,441.29	\$119,857.82	\$132,693.97	\$134,847.44	\$144,193.28	\$115,504.52
Ellenborough ..	69,124.92	71,709.22	75,344.17	76,319.98	80,258.60	86,727.31
Telok Ayer ..	20,167.00	19,337.50	19,025.00	19,219.50	19,228.00	18,954.00
Orchard Road	14,086.50	14,105.00	14,005.00	14,421.50	15,044.00	15,245.00
Kandang Kerbau	17,302.00	17,645.00	17,948.00	18,407.00	18,842.50	19,257.00
Grange Road ..	1,662.00	1,790.00	1,818.00	2,076.50	2,086.00	2,146.00
Geylang ..	abolished	abolished	abolished	—	—	—
Sims Avenue ..	4,103.50	3,742.50	3,630.00	3,663.00	3,741.00	3,734.00
Maxwell ..	7,259.50	7,407.50	8,340.00	9,116.00	9,342.50	11,151.50
Peoples Park ..	9,752.50	9,203.50	9,569.00	8,834.00	10,193.00	10,353.00
Joo Chiat ..	545.50	383.75	297.25	187.50	213.50	11.00 (4 months only)
	\$251,444.71	\$264,181.79	\$283,165.39	\$287,091.92	\$303,142.38	\$283,083.33

5% COMMISSION ON FRESH FISH SALES (TABLE C).

Market.	1933	1934	1935	1936	1937	1938
Clyde Terrace	\$ 65,787.79	\$ 78,719.82	\$ 91,445.97	\$ 94,053.94	\$103,987.78	\$74,579.52
Ellenborough ..	32,919.92	35,547.72	38,827.17	39,142.98	42,747.60	48,902.81
Telok Ayer ..	abolished	Nil.	Nil.	—	—	—
	\$98,707.71	\$114,267.54	\$130,273.14	\$133,196.92	\$146,735.38	\$123,482.33

Revenue from 5% commission on wet fish sales at Clyde Terrace Market dropped about \$29,000 but at Ellenborough an increase of \$6,000 is shown and with increased business in the other markets especially Maxwell Road the total decrease on last year's figures was in the region of \$20,000, wholly due to poor prices at auction of Japanese-caught fish.

STAFF.

I was given long leave in March and resumed duty on 4th November. Two coolies were given a month's notice at Clyde Terrace and the coolies from Joo Chiat took their places.

47 coolies reported sick during the year and were treated by Medical Officer in charge of Staff.

RETURNS.

The following returns are supplied regularly:—

Weekly. Price lists to Press, Registrar General of Statistics, etc.

Monthly. Total catch of fish to Fisheries Officer. Average monthly price list to Registrar General of Statistics.

(D-110)

Quarterly. Stock of foodstuffs in markets at 7 a.m. on 1st day of each quarter to Registrar General of Statistics.

Medical students and candidates for the Certificate of the Royal Sanitary Institute are shown around the markets and given any advice or information likely to be of use to them.

TOWN.

54,982 catties of unsound foodstuffs were collected from stores and shops in town and destroyed as unfit for human consumption. Surveys of frozen, tinned and other foodstuffs were made and consignments disposed of as I directed.

Samples. 1,178 official and informal samples were taken and submitted for analysis. Prosecutions were necessary in some cases and salutary fines imposed by the magistrates. Particulars of all samples will be found in the Municipal Analyst's report.

I attach returns showing the approximate amount of foodstuffs passing through the markets with their approximate value, the quantity of unsound foodstuffs destroyed and a summary of vacant stalls as on 31st December, 1938.

I have the honour to be,

Sir,

Your obedient servant,

Sd. M. MacMAHON,

Cert. R. San. Inst.,

Food and Market Inspector,

SUMMARY OF VACANT STALLS END OF DECEMBER, 1938.

	Clyde Terrace. No.	Ellenborough. No.	Telok Ayer. No.	Orchard Road. No.	Kandang Kerbau. No.	Maxwell Road. No.	Joo Chiat. Road No.	Grange Road. No.	Peoples Park. No.	Sims Avenue. No.
Dry Goods	1	1	1	..	..	7	..	1	..	..
Beef	9	..	1	..	..	3	..	6	..	1
Salted Vegetables .. ..	..	..	..	..	..	1	..	..	..	2
Mutton .. ..	..	..	..	..	..	1	..	..	..	2
Pork	2	..	4	2	..	4	..	1	..	3
Curry Stuff .. ..	..	..	..	..	..	..	..	..	..	..
Bean Cakes .. ..	..	..	1	..	..	5	..	..	..	1
Poultry	10	22	2	..	..	13	..	..	1	3
Vegetables and Fruits	21	9	31	..	1	23	..	5	..	20
Eggs .. ..	..	..	1	..	..	..	..	..	..	1
Money Changer .. ..	..	..	..	..	..	..	..	..	..	..
Eating .. ..	..	..	5	..	..	..	..	..	..	..
Fish	4	11	..	10	..	1	..	5	4	3
Shell Fish .. ..	..	..	..	..	..	..	..	..	..	..
Hawkers .. ..	..	..	..	..	..	..	..	1	..	..
Provisions .. ..	..	..	..	..	..	..	..	1	..	..
Dressed Ducks	1	..	..	..	..	3	..	..	..	1
TOTAL ..	48	44	46	12	1	61	..	20	5	37

M. MACMAHON,
Cert. R. San. Inst.,
Food and Market Inspector

**UN SOUND FOODSTUFFS DESTROYED
DURING THE YEAR 1938.**

(D-112)

Market.	Wetfish ctts.	Saltfish ctts.	Beef ctts.	Mutton ctts.	Pork ctts.	Vegetables ctts.	Fruits ctts.	Tinned Goods.		Bottles Preserves No.	Eggs No.	Miscella- neous.	Total Items.
								Cases.	Tins.				
Clyde Terrace	17,168	...	...	9	...	1,619	20	...	...	...	70	...	...
Ellenborough	6,123	1,022	...	...	...	168	...	...	...	...	434	13,246	...
Telok Ayer	...	124	...	...	...	9,970	5,295	...	...	...	459	...	...
Kandang Kerbau	152	...	...	...	...	6,455	3,904	...	...	...	685	31	...
Orchard Road	17	...	...	...	...	7,802	8,741	...	...	...	378	7	...
Maxwell Road	28	50	...	...	...	6,861	2,868	...	...	...	11,100	9	...
Joo Chiat Road	...	...	...	...	...	...	...	...	...	...	...	...	...
Grange Road	...	...	...	...	...	...	...	...	...	...	...	...	...
Peoples Park	...	...	...	...	...	...	...	...	...	...	...	...	...
Sims Avenue	...	...	...	...	...	...	...	...	...	...	...	...	...
	23,488	1,196	...	9	...	32,875	20,828	...	...	...	13,126	13,293	104,815
Town	2,089	...	3,852	...	...	17,994	...	4,530	19,324	485	...	6,708	54,982
Total	25,577	1,196	3,852	9	...	50,869	20,828	4,530	19,324	485	13,126	20,001	159,797

M. MACMAHON,
Cert. R. San. Inst.,
Food and Market Inspector.

**RETURN OF SOME OF THE FOODSTUFFS PASSING THROUGH MARKETS
DURING THE YEAR 1938.**

Market.	Wetfish ctts.	Boiled Fish ctts.	Shell Fish ctts.	Beef ctts.	Mutton ctts.	Pork ctts.	HEADS				Pigeons.	Turkeys.	Bean Cakes ctts.	Bean Sprouts ctts.	Approximate Value \$	cts.
							Fowls.	Capons	Geese	Ducks.						
Clyde Terrace	13,492,327	58,365	167,660	317,370	266,570	474,365	69,314	..	1,293	48,988	9,654	..	141,940	52,895	1,975,728	05
Ellenborough	5,597,472	..	190,716	11,402	..	826,200	56,243	1,851	3,468	85,698	1,889	..	164,401	552,510	1,366,336	56
Telok Ayer	43,483	..	47,840	38,151	84,263	270,514	37,413	..	877	12,533	3,460	83	..	..	202,695	42
Kandang Kerbau	835,497	40,246	..	160,947	242,116	434,075	49,375	..	..	14,694	..	..	40,601	..	497,327	61
Orchard Road	590,287	36,807	..	310,668	40,996	352,593	39,766	..	..	7,102	4,560	56	39,262	40,287	402,181	32
Peoples Park	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Maxwell Road	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Grange Road	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sims Avenue	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Joo Chiat Road	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	20,559,066	135,418	406,216	838,538	633,945	2,357,747	252,111	1,851	5,638	169,015	19,563	139	386,204	645,692	4,444,268	96

M. MACMAHON,
Cert. R. San. Inst.,
Food and Market Inspector

HEALTH DEPARTMENT.
Return of Prosecutions for the Year 1938.

OFFENCES.		TOTAL				
		Prosecutions	Withdrawn	Not Served	Convictions	Fines \$ cts.
Municipal Ordinance						
Obstructions	... ... Section 120	—	—	—	—	—
Offensive matter flowing into Public Drain	... ... ” 131	—	—	—	—	—
Establishing a private market	... ... ” 198	—	—	—	—	—
Unlicensed Offensive Trades	... ... ” 211	133	15	16	102	719 00
Using nightsoil/or urine as manure	... ... ” 213	3	—	—	3	9 50
Latrine etc. notice not complied with	... ... ” 219	—	—	—	—	--
Nightsoil kept for more than 48 hours	... ... ” 223	—	—	—	—	—
Filthy premises	... ... ” 233	122	1	2	119	671 00
Limewash notice not complied with	... ... ” 234	2	—	—	2	9 50
Non-compliance of notice for the destruction of rats and mice	... ... ” 235	—	—	--	—	—
Non-compliance of notice of demolition order of insanitary dwelling	... ... ” 236	--	—	—	—	—
Allowing premises to be overcrowded	... ... ” 237	—	—	—	—	—
Non-compliance with Nuisance Notice	... ... ” 246	16	—	—	16	15 00
Carried forward ...		276	16	18	242	1,424 00

HEALTH DEPARTMENT.

Return of Prosecutions for the Year 1938—(Contd.)

OFFENCES.	TOTAL				
	Prosecutions	Withdrawn	Not Served	Convictions	Fines \$ Cts.
<i>Brought forward</i> ..	276	16	18	242	1,424 00
Non-compliance with Nuisance Order 247	1	—	—	1	5 00
Non-compliance with Closing Order 247	—	—	—	—	—
Non-compliance of order for demolition of house unfit for human habitation 248	—	—	—	—	—
Non-compliance with Well Notice 254	—	—	—	—	—
Opening Well without permission 254	2	—	—	2	15 00
License not exhibited 381	1	—	—	1	2 50
Breaches of Offensive Trades Byelaws	9	—	—	9	59 50
Byelaws-Sections 58 & 211 M. O.					
Unlicensed Foodshops	475	27	43	405	1,170 00
Unlicensed Milk Vendors	56	8	—	48	377 00
Employing women without permission of H. O. ..	40	1	—	39	315 00
Opening licensed premises during prohibited hours ..	66	5	—	61	396 50
Conveying milk for sale without regulation bottles ..	—	—	—	—	—
<i>Carried forward</i> ..	926	57	61	808	3,764 50

HEALTH DEPARTMENT.

Return of Prosecutions for the Year 1938—(Contd.)

OFFENCES.	TOTAL				
	Prosecutions	Withdrawn	Not Served	Convictions	Fines \$ cts.
Brought forward ...	926	57	61	808	3,764 50
Failing to have name and address marked upon the vehicle/can ...	—	—	—	—	—
Unlicensed Piggeries ...	183	1	16	166	370 50
Filthy Stables, Cowsheds etc. ...	—	—	—	—	—
Breaches of the Foodshop Byelaws ...	183	10	1	172	945 00
(D-116)					
Markets and Slaughter Houses.					
Selling vegetables within 50 yards of market ...	—	—	—	—	—
Unsound Food ...	—	—	—	—	—
Slaughtering Animals except in Abattoirs ...	2	—	—	2	44 00
Market Byelaws ...	113	—	1	112	453 50
Sale of Food and Drugs Ordinance					
Selling Tea deficient in extract ...	3	—	—	3	12 00
Selling Adulterated Milk ...	92	4	13	75	1,807 00
Selling Adulterated Whisky ...	6	1	—	5	159 00
Carried forward ...	1,508	73	92	1,343	7,555 50

HEALTH DEPARTMENT.

Return of Prosecutions for the Year 1938—(Contd.)

OFFENCES.	TOTAL				
	Prosecutions	Withdrawn	Not Served	Convictions	Fines \$. Cts.
	1,508	73	92	1,343	7,555 50
<i>Brought forward</i> ..					
Selling Adulterated Brandy Section 11-1	3	—	—	3	145 00
Selling Adulterated Green Peas Ghee " 11-1	7	1	—	6	185 00
Selling Milk Deficient in Fat " 11-1	2	—	—	2	29 50
Selling aerated soda water having less than 5 grains of Sodium Bicarbonate " ..	2	—	—	2	44 50
Q. and P. Disease Ordinance.					
Failing to report case of Inf. Disease Section 3	—	—	—	—	—
Moving patient without permission " 18	—	—	—	—	—
Exposing patient while suffering " 18	—	—	—	—	—
Conveying patient in public vehicle " 23	—	—	—	—	—
Failing to have child vaccinated " 39-1	122	9	18	95	71 00
Failing to bring child for inspection " 40	—	—	—	—	—
Registration Births and Deaths Ordinance.					
Permitting a body to be buried without Burial Permit	1	—	—	1	—
<i>Carried forward</i> ..	1,645	83	110	1,452	8,030 50

HEALTH DEPARTMENT.

Return of Prosecutions for the Year 1938—(Contd.)

OFFENCES.		TOTAL				
		Prosecutions	Withdrawn	Not Served	Convictions	Fines
	<i>Brought forward</i> ...	1,645	83	110	1,452	\$ 8,030 50
Failing to Register Births ..	.. Section 11	10	—	1	9	7 50
Failing to Register Deaths ..	.. " 11-1	1	—	—	1	—
Wilfully furnished false particulars when registering a birth ..	.. " ..	4	1	—	3	59 00
Destruction of Mosquitos Ordinance						
Failing to comply with notice ..	... Section 9-1	5	4	—	1	99 50
Recovery of costs of work done ...	... " 8-1	—	—	—	—	—
Destroying Anti-malarial Works ...	... " 15	—	—	—	—	—
		1,665	88	111	1,466	8,196 50

Summary.

Total Inspections	...	57,110
" Prosecutions	...	1,665
" Withdrawn	...	88
" Not Served	...	111
" Convictions	...	1,466
" Fines	...	\$8,196 50

N.B.—Costs are not included in the amount of fines.

H. BENJAFIELD,
Chief Sanitary Inspector.

RETURN OF NOTICES SERVED AND COMPLIED WITH ETC., DURING THE YEAR, 1938.

NATURE OF NOTICES.		Brought forward from last year.	Served during the year.	Total.	Complied with during the year.	Carried forward to next year.	REMARKS.
Limewash Notice	.. ..	158	1,800	1,958	1,845	110	3 Cancelled
Intimation Notice	.. ..	535	211	746	650	71	25 "
Nuisance Notice	.. ..	—	51	51	12	38	1 "
Demolition Notice	.. ..	4	1	5	4	1	(D-119)
Latrine Notice	.. ..	66	387	453	224	148	81 "
Drain Notice	.. ..	—	124	124	109	14	1 "
Well Notice	.. ..	—	164	164	101	63	
Abatement Order	.. ..	—	1	1	—	1	
Anti Mosquito Notice	.. ..	1,025	290	1,315	684	631	
do. Intimation	.. ..	—	126	126	51	74	1 "
		1,788	3,155	4,943	3,680	1,151	112 Cancelled

H. BENJAFIELD,
Chief Sanitary Inspector.

NATURE OF LICENCE	Per Annum	Number Issued	CASH RECEIVED		DETAILS OF LICENCES ISSUED.															
			\$	cts.	For One Year	For One Month	For 2 Months	For 3 Months	For 4 Months	For 5 Months	For 6 Months	For 7 Months	For 8 Months	For 9 Months	For 10 Months	For 11 Months				
Charcoal Store	..	37	213	50	16	..	4	9	8	..	..	..	..	..	..	..	..
Blachan Store	..	3	72	00	3	..	..	..	..	..	..	..	..	..	..	..	..
Brick Kiln	..	3	150	00	3	..	..	..	..	..	..	..	..	..	..	..	..
Dye House	..	6	72	00	6	..	..	..	..	..	..	..	..	..	..	..	..
Drying and Sorting Fish	..	4	48	00	4	..	..	..	..	..	..	..	..	..	..	..	..
Fruit Preserving	..	3	150	00	3	..	..	..	..	..	..	..	..	..	..	..	..
Knacker's Yard			
Lime Making			
Lye Making			
Laundry	..	335	335	00	335	..	..	..	..	..	..	..	..	..	..	..	..
Offal Boiling			
Pottery Works			
Private Market	..	5	358	31	3	..	1	..	..	..	..	..	..	..	..	..	..
Rags and Bones Store			
Sago Factory	..	6	183	33	2	..	1	1	..	..	..	..	..	..	..	..	..
Sauce Factory			
Sheep or Goat Pen	..	6	44	00	2	..	..	..	..	..	..	..	..	..	..	..	..
Sugar Boiling	..	4	200	00	4	..	..	..	..	..	..	..	..	..	..	..	..
Soap Boiling	..	5	60	00	5	..	..	..	..	..	..	..	..	..	..	..	..
Sick Receiving House	..	7	7	00	7	..	..	..	..	..	..	..	..	..	..	..	..
Tannery	..	4	200	00	4	..	..	..	..	..	..	..	..	..	..	..	..
Importation of Frozen Meat	..	6	1,254	00	6	..	..	..	..	..	..	..	..	..	..	..	..
CATTLESHEDS, PONYSTABLES, COWSHEDS:																				
9 Animals & Under per head @	..	4	34	00	4	..	..	..	..	..	..	..	..	..	..	..	..
10-14 Animals	..	1	10	00	1	..	..	..	..	..	..	..	..	..	..	..	..
15-24 "			
25-50 "	..	1	18	75	..	..	..	..	..	..	..	..	..	..	..	..	..
Over 50 "	..	2	100	00	2	..	..	..	..	..	..	..	..	..	..	..	..
PONYSTABLE:																				
9 Animls and under per head	..	1	5	00	1	..	..	..	..	..	..	..	..	..	..	..	..
COWSHED:																				
Over 50 Animals	..	1	50	00	1	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL			..		444	\$3,564	89													

(D-121)

MUNICIPAL ABATTOIR,

Singapore, 12th January, 1939.

THE MUNICIPAL HEALTH OFFICER,

SINGAPORE.

Sir,

I have the honour to submit my report for the year ended 31st December, 1938. During this period 268,719 swine, 13,866 oxen, 35,246 sheep, 3,688 goats and 77 buffaloes were slaughtered in the Municipal Abattoirs making a total of 321,596 animals as against 324,002 during the year 1937. The carcasses of 1,651 swine, 145 oxen, 110 sheep, 49 goats and 1 buffalo were found to be so diseased as to require total condemnation. There was evidence of tuberculosis in the carcasses of 1,154 swine and 100 oxen.

The importation of cattle and swine from Saigon ceased at the end of May and, as a result, the number of Malayan pigs admitted to the Abattoir reached a total of 182,665 as against 155,465 during the previous year.

It was found necessary to resort to night slaughtering in the pig abattoir from 13th till 18th September, during which time extensive repairs were carried out to the cooling plant.

Towards the end of the year the landing jetty at French Road was extended and repaired and there is now ample room for the landing of imported pigs.

Carcasses and organs amounting to 302 tons 2 cwts. were destroyed at the Municipal Incinerator.

I attach details of animals admitted, diseases detected and fees collected.

I have the honour to be,

Sir,

Your obedient servant,

D. WILSON,

Superintendent of Abattoirs.

**PARTICULARS OF ANIMALS ADMITTED FOR SLAUGHTER, Etc.,
DURING THE YEAR ENDED 31st DECEMBER, 1938.**

	Swine	Oxen	Buff- aloes	Sheep	Goats
Admitted for slaughter during the year ended 31st December, 1938 ..	269,571	13,841	77	35,399	3,742
Admitted for slaughter during the year ended 31st December, 1937 ..	270,863	17,409	94	32,572	4,502
Died in Pens	1,554	4	—	114	46
Brought in by ambulance	—	438	—	—	—
Carcases (complete) condemned as unfit for consumption	1,651	145	1	110	49
Diseased organs etc., condemned and destroyed in tons	49.6	17.2	.4	4	1.3
<hr/>					
Fees for slaughter at Cattle Section .. ..	..	..	..	\$ 13,918.00	
„ „ „ „ Sheep Section .. ..	..	..	..	13,699.35	
„ „ „ „ Pig Section .. ..	..	..	..	134,785.50	
„ „ storage in chilling room .. ..	..	..	..	3,607.50	
„ „ „ at French Road Dépôt .. ..	..	..	..	7,784.61	
Receipts as pen rents (all slaughter houses) .. ..	..	..	..	7,649.10	
„ for sale of blood .. ..	..	..	..	1,032.00	
„ „ „ „ pigs' bristles .. ..	..	..	..	30.00	
Total receipts for the year ended 31.12.38 .. ..	..	..	..	\$182,506.06	
„ „ „ „ 31.12.37 .. ..	..	..	..	\$184,850.45	
<hr/>					
Special slaughtering licenses issued during the year ended 31st December, 1938—					
(17 sheep and 16 goats @ \$3.50 each) .. ..	..	..	..	\$115.50	

CARCASSES TOTALLY CONDEMNED DURING THE YEAR, 1938.

	Swine	Oxen	Buffaloes	Sheep	Goats	Total
Anaemia ..	—	—	—	3	1	4
Bruising, Extensive and Severe ..	11	5	—	2	—	18
Caseous Lymphadenitis	—	—	—	3	—	3
Cysticercus Bovis ..	—	11	—	—	—	11
Cysticercus Cellulosae .	841	—	—	—	—	841
Dropsy, General ..	8	1	—	9	1	19
Emaciation, General, Pathological ..	42	82	—	41	25	190
Jaundice ..	64	8	—	1	—	73
Mammitis, Acute, Septic	4	—	—	—	1	5
Metritis, Septic ..	22	1	—	—	6	29
Moribund ..	26	—	—	1	—	27
Pericarditis, Septic ..	—	2	—	—	—	2
Peritonitis, Septic ..	34	—	1	—	—	35
Pneumonia, Gangrenous	55	—	—	3	13	71
Pyæmia ..	18	—	—	—	—	18
Pyrexia ..	355	1	—	9	1	366
Rinderpest ..	—	4	—	—	—	4
Sarcosporidiosis ..	3	—	—	—	—	3
Septicaemia ..	34	1	—	36	1	72
Swine Fever ..	106	—	—	—	—	106
Tuberculosis, Generalized	24	29	—	—	—	53
Other Conditions ..	4	—	—	2	—	6
Total 1938 ..	1,651	145	1	110	49	1,956
Total 1937 ..	2,004	59	3	47	80	2,193

**ANIMALS SLAUGHTERED MONTHLY, IN MUNICIPAL ABATTOIRS
DURING THE YEAR 1938.**

			Swine	Oxen	Buffaloes	Sheep	Goats
January	..	..	26,224	1,123	1	2,254	481
February	..	..	21,842	1,233	1	2,868	360
March	..	..	23,142	1,223	—	2,273	280
April	..	..	22,351	1,186	12	2,228	276
May	..	..	23,281	1,223	26	2,685	251
June	..	..	20,592	1,198	14	2,542	238
July	..	..	21,962	1,153	1	2,608	314
August	..	..	22,449	1,078	8	2,678	364
September	..	..	20,820	1,076	2	4,012	254
October	..	..	21,615	1,140	1	4,369	286
November	..	..	21,181	1,184	8	3,596	287
December	..	..	23,260	1,049	3	3,133	297
Total for the year 1938			268,719	13,866	77	35,246	3,688
Total for the year 1937			269,560	17,375	94	32,510	4,463

